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P RASPIN

**SCANNING BUSINESS ENVIRONMENTS: AN INVESTIGATION INTO
MANAGERIAL SCANNING BEHAVIOUR**

SCHOOL OF MANAGEMENT

PHD THESIS

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CRANFIELD UNIVERSITY

SCHOOL OF MANAGEMENT

PHD THESIS

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Scanning Business Environments: An investigation into managerial scanning behaviour.

Supervisor: C Bowman

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ABSTRACT

This research sought to obtain a detailed understanding of the scanning behaviour of senior managers. Prior literature that substantially informed this research was drawn from three areas: environmental scanning, competitive strategy, and to a lesser extent, managerial cognition. The purpose of this research was to 1) provide an updated in-depth understanding of the phenomenon of scanning behaviour, 2) to attempt to identify what influences scanning behaviour at an individual level, 3) to assess the collective state of management researchers' knowledge of scanning through contrasting the findings of this research with all major prior scanning studies, and 4) to consider the implications for organisations on how to more effectively scan both the task and remote environments.

The research approach included conducting in depth qualitative pilot studies and analysing data from an extensive survey completed by 394 senior managers. The major findings were that scanning behaviour appears to be an embedded routine that is not obviously strongly related to job specific, individual experiential, or organisational contextual variables; that significant components of scanning behaviour such as formality of approach, degree of use of personal resources, and breadth of scanning coverage were identified that help to discern differences in individual scanning behaviour; and that the inconclusive results of prior scanning studies indicate that a change in research direction is needed to focus on a different set of influencing variables.

Major managerial implications included the need to understand biases in managerial scanning behaviour; to work with and not against managerial scanning behavioural biases; to support a mix of scanning behaviours in an organisation; to deliberately allocate scanning resources to cover environmental sectors; to selectively use managers external to the organisation; to utilise a variety of different sources; and to align scanning activities with organisational strategy processes.

Limitations of this research are mostly methodological concerning survey bias skewed to UK managers and the extent that espoused responses differ from actual behaviour. Future research opportunities include testing an alternative set of influencing variables such as personality characteristics and learning styles; analysing the interaction of the scanning components identified to strategy processes; and researching scanning from an organisational perspective.

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Notwithstanding the considerable help of these people, I stand wholly responsible for whatever good or bad is to be found in this thesis.

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1. Introduction

Scanning is a formidable subject for the management researcher in the sense that it is both a critically important activity within the strategy formulation process and it is also a notoriously difficult activity to research.

Three factors in combination encouraged the initiation of this research into managerial scanning behaviour. First, the need for senior managers to effectively scan their environment has arguably become increasingly more important in recent years consistent with the increase in the rate of change within the environment in general. The view that scanning is a critically important activity within the strategy process has been emphasised in both the business policy and organisation theory literature (Bourgeois, 1980), and would probably receive little dispute among strategic management researchers. When managers misinterpret changes in their environment or fail to notice changes that turn out to be important, they may not make needed adjustments to an organisation's strategy or structure (Pfeffer and Salancik, 1978). The ensuing lack of fit between the environment and the organisation's strategy or structure may result in performance decline and other types of crises (Dunbar & Goldberg, 1978; Nystrom & Starbuck, 1984; Weick, 1987).

Second, according to prior scanning research, top managers' understanding of the scanning process was found to be generally limited and reflected very little explicit consideration of the scanning process and the issues involved (Aguilar, 1967; Kefalas & Schoderbek, 1973; Hambrick, 1982). While scanning and interpretation may be among the most important functions that senior managers perform, the process is so familiar that it is often taken for granted. Almost all activities in organisations, whether under the heading of structure, decision making, strategy formulation, organisational learning, goal setting, or innovation and change, may be connected to the mode of interpreting the external environment. Yet, prior research evidenced a general lack of a coordinated approach to considering the problems inherent in scanning.

Third, the management literature has not recently given significant attention solely to the subject of scanning. Instead, recent relevant studies have tended to incorporate scanning as a minor part of the phenomenon being studied or have referenced scanning as part of the broader organisational interpretation process only (Boyd, Dess & Rasheed, 1993; Dess & Keats, 1987; Fahey & Narayanan, 1989; Hambrick, 1982; Milliken, 1990; Yasai-Ardekani, 1989; Waller, Huber, & Glick, 1995).

These three factors – the importance of scanning in the current environment, the lack of explicit consideration concerning scanning effectiveness among top management, and the lack of recent attention to scanning behaviour in the management literature – were the basis for presupposing that this in-depth exploratory research effort would represent a contribution to management knowledge.

Prior to conducting this research a review of the literature was undertaken to gain an appreciation of the difficulties inherent in researching scanning. Four arguments emerged that in combination support the view that scanning is difficult to research. First, scanning is difficult to research because it is a component within the complex

organisational process of strategy formulation (Mintzberg and Waters, 1985). Second, scanning is intimately involved in the decision making processes of individual managers which makes it a difficult activity to isolate (Mintzberg, Raisinghani, and Theoret, 1976). Third, scanning represents a basic behavioural aspect of managers' activity and is not always done with conscious awareness, which makes it a difficult activity to analyse (Hambrick, 1982). And fourth, scanning research involves consideration of the construct of the environment, which leads to an unresolved issue in the environmental literature - that of objective environment versus perceived or enacted environment (Downey, Hellriegel, and Slocum, 1975; Weick, 1979, Smircich and Stubbart, 1985).

A consideration of these research difficulties was factored into the research design. As scanning has been positioned as a component within strategy formulation processes, an attempt was made to identify which strategy processes were predominant in each manager's organisation and to analyse whether different strategy processes were associated with differences in scanning behaviour. The challenge of isolating an otherwise unconscious type of activity was tackled through a series of in-depth pilot studies and an extensive survey that exclusively focused on aspects related to scanning behaviour. In terms of the vagaries of managerial perceptions of both scanning behaviour and the environment, it was acknowledged that as yet there is no wholly satisfactory protocol for identifying what people perceive in complex natural settings. Thus, after considering various methods and related shortcomings (Waller, Huber, & Glick, 1995; Snyder & Glueck, 1980), an approach to directly ask research subjects about their perceptions and actions was adopted.

This research was predominantly exploratory in nature in that it was more concerned with describing how senior managers currently scan rather than prescribing how they should be scanning. As a consequence the findings are largely descriptive of individual managerial behaviour although by no means does this research simply report what information was obtained. Analysis and interpretation concerning the how, what, and where of scanning behaviour is offered in detail. This research effort initially set out to better understand the relatively under explored phenomenon of scanning behaviour as a precursor to be able to suggest how to meaningfully influence scanning behaviour. At the same time, it also tested for the strength of association of a number of potential influencing variables; variables that featured in prior conceptual or empirical studies into scanning practices. Analysis of variance (ANOVA), chi square tests, principal components analysis, and multiple regression were all employed to analyse scanning behaviour and the statistical significance of various influencing variables on scanning behaviour.

The major contribution of this research was in terms of existing theory. Existing theory concerning scanning was tested through replication and confirmatory tests. The tests contributed to understanding the nature and significance of scanning behaviour and confirmed the inconclusive results of the strength of association of various influencing variables (e.g. hierarchical level, functional roles, company size, etc.) on scanning practices. This research further developed and extended theory of scanning practices by analysing the scanning behaviour of not just chief executives, but also top tier management (i.e. tiers 1, 2, and 3 levels below CEO). This research also extended theory through empirically testing the validity of a conceptual typology of scanning

behaviour drawn from prior literature (Aguilar, 1967). New or unique contributions to existing theory emerged through identifying significant components of scanning behaviour that help to discern differences in individual scanning behaviour. A further new contribution was to analyse the link between scanning behaviour and strategy process (as opposed to strategy content). A minor contribution was made in terms of methodology based on learning from using an online survey instrument. Learning concerned how to gain improvements in response rates through changes in survey invitation messages, addressee details, and the timing of sending out the email invitations. Finally, a contribution to practicing managers resulted through providing a current description of scanning practices; clarifying what influencing factors are significantly associated with certain aspects of scanning behaviour; and producing a set of managerial implications on how to effectively scan business environments.

Although the focus of this research was an exploratory effort to better understand scanning behaviour as a precursor to meaningfully influencing it, some consideration of potential implications to practicing managers was also given. At an individual level the major implications were to understand and work with scanning behavioural biases. At an organizational level, further considerations included supporting a mix of scanning behaviours in an organization; selectively directing individual managers to cover certain environmental sectors to varying degrees depending on strategic importance and strategic uncertainty; diversifying the use of sources including selectively drawing on external managerial expertise; and explicitly considering the link between embedded scanning behaviour among the management team and organizational strategy formulation processes.

As in all management research, various limitations should sensibly be acknowledged. These included biases resulting from adopting the realist perspective; the influence of the researcher in the pilot studies; differences between espoused theory and theory in practice; sampling bias toward UK managers; and challenges to the validity of the operationalisation of key variables tested.

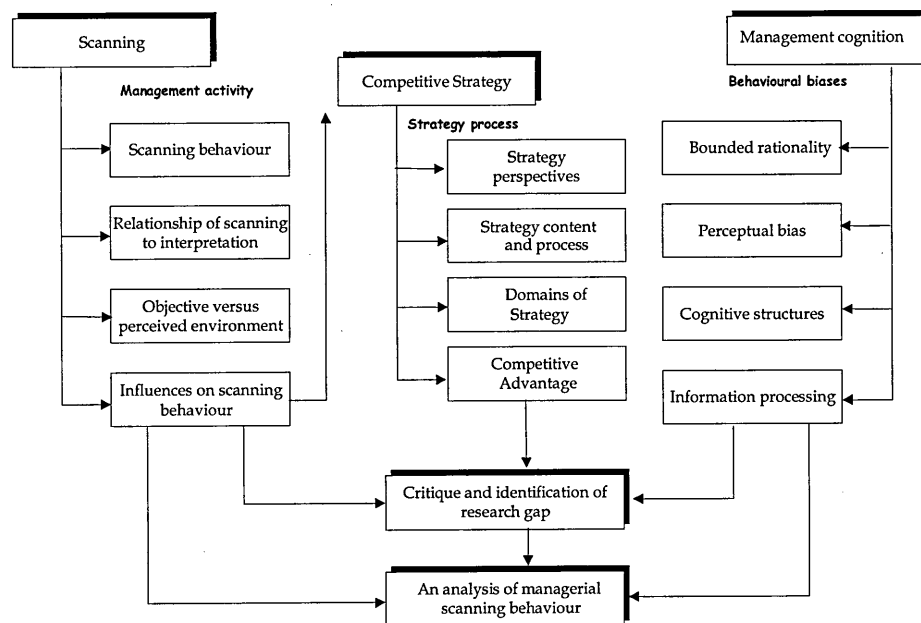
The findings of this research have multiple implications for future research. Major implications include testing an alternative set of influencing variables such as personality characteristics and learning styles; further considering the efficacy and fit between scanning behaviour and strategy processes; and researching scanning from an organisational perspective to better understand the inter-relationship between different scanning behavioural biases among the management team.

2. Literature Review

2.1 Literature Review Framework

There are three major areas of literature that inform this research – environmental scanning, competitive strategy, and to a lesser extent, managerial cognition. Each of these areas is represented in the below Figure 1.

Figure 1: The literature review framework.



The first area, environmental scanning, is critical to understand as it is the managerial activity of interest to this research. The second area, competitive strategy, provides information that is helpful to understand how scanning is a component within the complex organizational process of strategy formulation. The literature of competitive strategy also provides a brief overview of the major typologies of strategy process which informs a subsequent proposition on the relationship between different types of scanning behaviour and organisational strategy process types. The third area, managerial cognition, helps us to understand the interpretative aspects of scanning behaviour (e.g. bounded rationality, perceptual bias, etc.). This last area is important as scanning is conceptualized in this research as comprising the twin activities of data gathering and data interpretation.

The subsequent sections contain a summary of the key literature findings for each of the sub-areas identified in the above Figure 1, The literature review framework.

2.2 Environmental Scanning

2.2.1 Scanning Behaviour

This section reflects on the findings of the key empirical studies of scanning behaviour. Common to all of these studies is a focus on describing scanning practices and on gathering information sufficient to describe the practical observable features of scanning, such as what information was sought, from where this information was sought, how this information was obtained, how many hours managers spend scanning, how frequently managers scan, and so on.

Aguilar's (1967) study, "Scanning the business environment", was the seminal study on scanning behaviour which was concerned with the way in which top management gains relevant information about events occurring outside the company in order to guide the company's future course of action. A working definition of scanning is "the activity of acquiring information about events and relationships in a company's outside environment, the knowledge of which would assist top management in the task of charting the company's future course of action" (Aguilar, 1967: 1). Aguilar's (1967) study primarily described the "what", "where", and "how" of this process.

Aguilar (1967) presents a most extensive analysis of the manager's external information. His study, based on interviews and the analysis of critical incidents, categorises information by kind, source, and method of finding (solicited, unsolicited, and so on). Aguilar breaks the data down for managers at three levels in the hierarchy; in general management, marketing, and technical and other functional areas; in small, medium, and large companies; and for experienced (more than three years) and inexperienced (less than one year) managers. Major findings with respect to the "what", "where" and "how" of the scanning process are outlined below.

Findings regarding "what external information do managers obtain" were as follows:

- market tidings outstripped other areas of information in importance;
- in general there was a connection between the manager's area of speciality and the subject matter of the external data collected and regarded as important;
- there were few differences across managers at different hierarchical levels and the external information they obtained; and
- managers in large companies were less concerned with short range marketing and technical information and more concerned with broad issues, acquisition leads, and other information than managers in medium sized companies.

Findings regarding "where do managers obtain external information" were as follows:

- managers tend to rely almost as much on inside sources as on outside sources for important external information;
- personal sources far exceed impersonal sources in importance;

Aguilar's four modes of scanning are defined as follows. Mode 1, Undirected Viewing, is described as general exposure to information where the viewer has no specific purpose in mind with the possible exception of exploration. Mode 2, Conditioned Viewing, is directed exposure, not involving active search, to a more or less clearly identified area or type of information. Mode 3, Informal Search, is a relatively limited and unstructured effort to obtain specific information or information for a specific purpose. Mode 4, Formal Search, is a deliberate effort usually following a pre-established plan, procedure or methodology to secure specific information or information relating to a specific view.

The four sets of rules proposed by Aguilar were developed based on the idea of coupling; that is, coupling various information requirements with one or another of the modes of scanning. On some basis, decisions must be made as to how each of an organisation's many requirements for information will be satisfied and these decisions may be thought of as being guided by a set of rules. These sets of rules are worth elaborating on because they demonstrate the substantial range of variables hypothesized to influence scanning behaviour.

The first set of rules, issue-related rules, pertain to such variables as: 1) the scope or magnitude of the issue, measured in terms of its impact on long-term return on investment or on other goals and sub-goals of the total organisation or its parts; 2) the urgency or timeliness of the issue; 3) the extent to which an issue constitutes a problem; 4) the extent to which an issue and its informational needs are readily definable; and 5) the relationship of the issue to some major long-range plan.

The second set of rules, information-related rules, relate to the following: 1) the adequacy of existing information, 2) the availability of additional data; and 3) the predictability or regularity with which information might appear.

The third set of rules, capacity related rules, include: 1) the time, energy, and other resources that executives or administrators can devote to scanning; 2) the number and nature of important issues competing for attention; 3) the types and levels of scanning skills available in the organisation; and 4) the interests and values of the individuals who do the scanning.

Aguilar proposes that these three sets of rules will continue to guide scanning behaviour for just as long as the right information is being acquired. However, if the present system fails to meet the needs or desires for information, then a fourth set of rules – change rules – may apply. Variables that serve as cues for needed changes in the scanning process are: 1) the extent to which the scanning activities provide the required information for the satisfactory achievement of the existing goals, policies, expectations, and so forth; 2) the extent to which the existing goals, policies, and expectations are in themselves perceived as adequate; and 3) the extent to which decisions lead to changes in informational requirements.

Aguilar's (1967) study undoubtedly contributed much to the understanding of scanning practices. However, two limitations of the study are worth noting. First, Aguilar's study was limited in scope to report on what is happening when a business organisation

scans its environment for information i.e. the observable aspects of scanning behaviour versus the interpretative aspects. Hence, the focus of the study was on the recognition of, search for, and internal communication of external information by individuals in a given organisation, and not on the analysis or interpretation of their information. Aguilar acknowledges this limitation to his study when he states that “the distinction between the search and interpretation cannot always be maintained” (Aguilar, 1967: 17) and “we cannot ignore the results of a manager’s analysis and interpretation when considering why he searches as he does” (Aguilar, 1967: 17). However, for the most part, Aguilar’s study does not address this aspect.

The second notable limitation is due to the environmental sector typology used. Aguilar combines an initial set of 16 environmental sector categories into just 5 categories. The five sector typology used was 1) market tidings, 2) technical tidings, 3) broad issues, 4) acquisition leads, and 5) other tidings. The limitation arises through combining too many important sub-sectors into one sector. For example, market potential, structural change, competitors and industry, pricing, sales negotiations, and customers are categorised into the one overall category of market tidings. Aguilar’s analysis that “the most striking point about the overall evidence is the extent to which market tidings outstripped other areas of information in importance” (Aguilar, 1967: 42) is not that striking considering the categorization scheme used. To illustrate this point, consider that Aguilar’s definition of market tidings arguably incorporates five of the ten environmental sectors used in the Waller, Huber, & Glick (1995) study. This point is particularly relevant to this study as a key proposition concerns the weight of attention paid by senior managers to various environmental sectors.

Upon first reading, these research findings may appear surprising, even puzzling. If analysis of the environment is critical since environmental change may change the significance of resources to the firm (Penrose, 1959) then you might expect that changing environments would require firms to develop sophisticated environmental scanning systems. Instead, Aguilar’s study identifies an ad-hoc, unsystematic approach to scanning whereby the dominant mode of scanning is undirected and conditioned viewing, with a high use of personal information sources. While somewhat initially surprising, these findings which give the impression of scanning as an ad-hoc, unsystematic, and predominantly informal process are consistent with other subsequent studies, including Keegan (1974).

Keegan’s (1974) study, “Multinational scanning: A study of the information sources utilized by headquarters executives in multinational companies”, found that none of the management groups in the sample used a formal system for monitoring published information, a somewhat surprising finding in light of the size of the larger companies in the sample. When questioned, executives were divided between those who expressed some interest in the possibilities of such a system, and those who felt that an expenditure on such an effort would not be worth the gain.

The major finding of Keegan’s study was to confirm one of Aguilar’s key findings that managers’ placed great importance on personal sources of information and particularly sources outside the organisation. It also reveals how little executives rely upon systematic scanning methods. Computer based information systems were not detected

in the study and even organised and managed manual systems were hardly significant as factors in day to day information gathering.

The findings suggest that 1) executives in large business organisations rely much more on external sources for information about their business environment than is commonly believed, 2) how little the systemic methods of business environment scanning have become a part of the way in which executives learn about their business environment, 3) the importance of organisational boundaries on intracompany information flows (divisional boundaries, functional specialization, and level were found to be significant barriers to the flow of information), and 4) overall, respondents acquired external information mainly from sources outside their own companies. However, abroad they relied mainly upon sources inside their companies.

Keegan's (1974) study was significant because it was another effort to study scanning behaviour in-depth and it confirmed some key findings from prior studies as described above. However, it also raised a set of unresolved issues and unanswered questions. Keegan's last comments call for further "studies of the influence of systematic scanning programs that have been developed and introduced in a handful of companies" (Keegan, 1974: 421).

Daft, Sormunen, and Parks (1988) acknowledged these fundamental puzzling findings regarding scanning behaviour in their study as follows: "There is a continuing puzzlement about formal versus informal scanning in organisations. A complex environment would seem to call for the increased use of sophisticated scanning systems. Executives have access to a variety of formal and informal media, yet most information at top levels is gained through ad hoc, human sources." (Daft, Sormunen, and Parks, 1988: 124). The observation that top management scanning tends to be irregular rather than systematic has been made in many prior studies (Preble, 1978; Thomas, 1980; Hambrick, 1982; Mintzberg, 1973; Kefalas and Schoderbek, 1973; Fahey, King, and Narayanan, 1981).

Hambrick's (1982) work attempted to address one aspect of this subject by empirically testing the premise that executives would scan to reinforce their organisation's particular basis for competing. Hambrick found that among the three industries studied - private liberal arts colleges, voluntary general hospitals, and life insurance firms - there were differences in the strategy-scanning link. These differences may have been attributable to different dominant environmental requirements existing in each industry.

Interestingly, Hambrick concluded that the initial premise of the paper was not supported by the data; upper-level executives did not indicate a consistent, concentrated tendency to scan according to their organisation's strategies. He suggested that this may be due to a general tendency among executives to scan according to their own personal or functional interests, lack of awareness of the organisation's strategy, or differences in how the researcher and the executive conceived of strategy.

Hambrick's paper was significant as much for the issues it raised about the difficulties of researching scanning and operationalising the variables under study, as for the results. Research design problems included low theoretical validity based on the choice of strategic typology and environmental taxonomy, choice of industries, and reservations about the way the research concepts were operationalised.

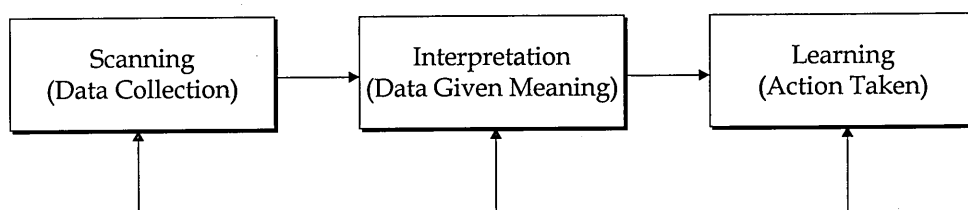
Other subsequent studies built upon these practical observations concerning describing scanning practices to consider the role and relationship of scanning in an organisation's interpretation process.

2.2.2 Relationship of Scanning to Interpretation

This section introduces a theoretical model of the relationship between scanning, interpretation, and learning and references two empirical studies that provide modest empirical support for this model. At both a theoretical level (Daft & Weick, 1984) and an empirical level (Aguilar, 1967) it is acknowledged that there may be considerable overlap between the tasks of scanning and interpretation. Hence, the term "scanning behaviour", for the purposes of this research, will incorporate both the tasks of scanning (data collection) and interpretation (data given meaning).

Scanning may be thought of as the first stage of an organisation's interpretation process (Daft & Weick, 1984). Scanning is just one of many interpretation images in the literature which include monitoring, sense making, interpretation, understanding, and learning (Duncan & Weiss, 1979; Hedberg, 1981; Weick, 1979; Pfeffer & Salancik, 1978). Daft & Weick (1984) propose that these concepts or interpretation images can be roughly organised into three stages – scanning, interpretation, and learning - that constitute the overall interpretation and learning process as represented in Figure 3 below.

Figure 3: Relationships among organisational scanning, interpretation, and learning



Source: Daft, R. and Weick, K. (1984) "Toward a model of organisations as interpretation systems," Academy of Management Review, Vol. 9, No. 2, 284-295

However, Daft & Weick (1984) acknowledge that the separation of these concepts into three stages and the definitions proposed for scanning, interpretation, and learning may oversimplify complex processes. For example, factors such as beliefs, politics, goals, and perceptions may complicate the organisational learning cycle (Staw, 1980).

Aguilar's (1967) study also suggests that separating the concepts of scanning, interpretation, and learning may be over simplistic. In particular, Aguilar notes that the distinction between scanning and interpretation cannot always be maintained, "for we are dealing with two interacting halves of the same loop" (Aguilar, 1967: 17). The selection of areas for scanning, the degree of attention, and the discrimination among the data impinging upon the individual are all a function of objectives and concerns.

Daft and Weick's (1984) proposed model of organisations as interpretation systems, as recreated in Figure 4 below, is particularly influential on this research as amongst other aspects, it proposes a typology of search and interpretation modes. These search and interpretation modes of undirected viewing, conditioned viewing, enacting, and discovering are based upon the four scanning modes proposed by Aguilar (1967) of undirected viewing, conditioned viewing, informal search, and formal search. This research effort builds on Daft & Weick's model in that it is concerned with understanding scanning behaviour or modes, including understanding the interpretative aspects of this behaviour, albeit from an individual perspective versus an organizational perspective. This focus on individual scanning behaviour is consistent with one of the underlying assumptions in this study, that is it is a relatively small group of individual senior managers at the top of the organisational hierarchy who formulate the organisation's interpretation.

Figure 4: Model of organisational interpretation modes

Unanalysable Assumptions about environment Analysable	Undirected viewing Constrained interpretations. Non-routine, informal data. Hunch, rumor, chance opportunities.	Enacting Experimentation, testing, coercion, invent environment. Learn by doing.
	Conditioned viewing Interprets within traditional boundaries. Passive detection. Routine, formal data.	Discovering Formal search. Questioning, surveys, data gathering. Active detection.

Passive
Active

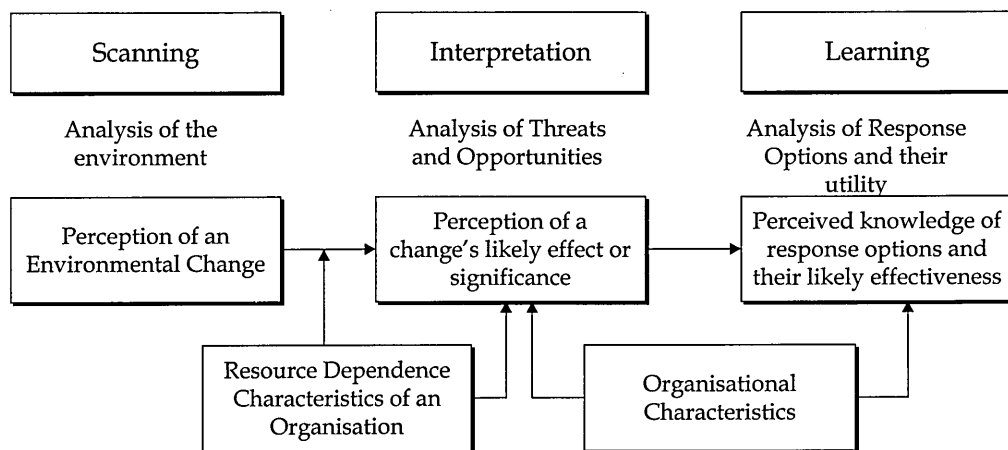
Organisational Intrusiveness

Source: Daft, R. and Weick, K. (1984) "Toward a model of organisations as interpretation systems," *Academy of Management Review*, Vol. 9, No. 2, 284-295

A further study, “Perceiving and interpreting environmental change: An examination of college administrators’ interpretation of changing demographics” (Milliken, 1990), was also informative of the relationship between scanning and interpretation. Milliken’s (1990) study broadly adopted the Daft & Weick (1984) model linking scanning, interpretation, and learning but placed emphasis on the individual versus organizational interpretation processes of environmental change.

Milliken's (1990) discussion of environmental interpretation noted that researchers have developed a number of models to describe the process by which decision makers notice and interpret issues and events in their environments (Cowan, 1986; Daft & Weick, 1984; Dutton & Duncan, 1987; Johnson, 1983; Kiesler & Sproull, 1982; Lyles & Mitroff, 1980). These models tend to use different labels for the processes they describe, including environmental interpretation, problem formulation, problem sensing, issue management, and strategic diagnosis. The model of environmental interpretation that Milliken drew upon was Daft & Weick's (1984) model represented in Figure 3 above. This is reflected in the top three boxes of Milliken's (1990) model as recreated in Figure 5. This was an appropriate fit on the basis that the model specifically focuses on describing the process by which managers perceive, interpret, and attempt to respond to changes in an organisation's external environment.

Figure 5: Milliken's (1990) Research model



Source: Milliken, F. (1990) "Perceiving and interpreting environmental change: An examination of college administrators' interpretations of changing demographics." *Academy of Management Journal*, 33 : 42-63.

Milliken's (1990) research mapped three types of environmental uncertainty – state, effect, and response – onto each of three major tasks – scanning, interpretation, and learning – in that order. Most significantly, Milliken (1990) concluded that the results offer empirical support for Daft & Weick's (1984) proposition that organisational adaption involves three distinct tasks – scanning, interpreting, and learning. Milliken's basis for this conclusion is "to the extent that the different type of uncertainty judgments are, in fact, linked to managers' experiences of those different tasks, it seems reasonable to argue that the tasks are empirically distinct from one another" (Milliken, 1990: 58).

Milliken's study examined the effect of organisational and resource dependence factors on college and university administrators' interpretation of an objectively verifiable environmental change: the decline in the number of 18-22 year olds in the United States. Results indicated that these characteristics significantly affected the

interpretation of changing demographics but explained relatively little variance in administrators' certainty about how to respond to a changed environment.

In general, the pattern of results suggests that there are meaningful distinctions between the three types of uncertainty – state, effect, and response; that although state certainty and effect certainty were positively correlated, state certainty explained less than 9% of the variance in effect certainty; and no relationship emerged between state certainty and response certainty, suggesting that merely perceiving the existence of an environmental change does not help to clarify strategic options for responding to the change. The significant relationship between effect certainty and response certainty suggests that the more certain managers are that they are facing a significant threat, the less sure they are of their ability to respond effectively. As hypothesised, resource dependence factors appeared to affect how environmental changes were interpreted, not whether they are noticed or whether managers will know how to respond. Contrary to Milliken's (1990) predictions, decentralisation was not related to perceived effect certainty or to response certainty.

Milliken's (1990) findings showed that individual's perceptions influence their environmental interpretation processes. For example, administrators who perceived their institutions as effective and as having a strong institutional identity tended to be less convinced that the changing demographics would affect their institution and more certain that the institution would be able to respond effectively. The research also suggested that examining the interpretation of specific environmental changes may be a useful way of gaining insight into the factors that influence the environmental interpretation process.

A further influential study that investigated the scanning, interpretation, and action linkage was that of Thomas, Clark, and Gioia (1993), "Strategic sensemaking and organisational performance: Linkages among scanning, interpretation, action, and outcomes." Using path analyses on data from 156 hospitals, this study tested the direct and indirect effects amongst these sensemaking processes and performance outcomes and developed a model of their relationships. Overall, the main contribution of this study is its specification of links between the cognitive tasks of scanning and interpreting and organisational actions and performance. More generally, the study established an empirical basis for exploring and understanding linkages among cognition, action, and outcomes and provided some insight into sensemaking processes that contribute to variations in organisational performance.

2.2.3 Objective versus Perceived Environment

This section reviews the construct of "the environment", discusses the issue of objective versus perceived environmental measures, reviews the two major explanations for the differences between objective and perceptual measures by reference to level of analysis and four types of mediating factors (i.e. individual, workgroup, organisational, and strategic focus), and concludes on the suitability of perceptual versus objective measures for this research.

Within organisational theory literature, ever since the system properties of organisations had been recognised (Barnard, 1938), organisations have been conceptualised as open systems engaging in transactions with their environments. Since Barnard's recognition, subsequent researchers have searched for causal relationships between the environment and organisational properties such as managerial autonomy, organisation structure and administration, management styles, information processing needs (Dill, 1958; Lawrence & Lorsch, 1967; Thompson, 1967; Duncan, 1972; Galbraith, 1973). Much of the resulting research relies on field studies and correlational techniques to impute a causal link from environment to variables like structure, but some results suggested that organisations themselves influence perceptions of the environment and environmental uncertainty (Huber, O'Connell, & Cummings, 1975). Based on contradictory empirical results, surfaces an as yet unresolved issue in the environmental literature, that of objective versus perceived environment.

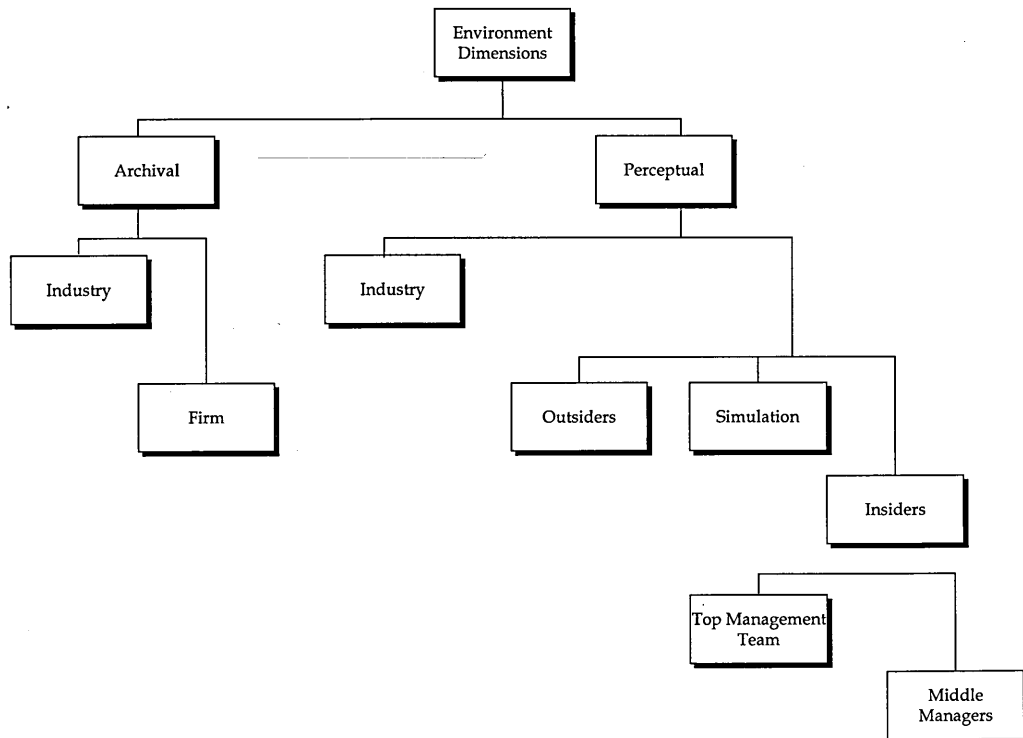
The unresolved issue hinges on two questions: first, is the objective environment construct or the perceived environment construct the most relevant to an organisation's behaviour and performance ?; and second, what is a valid and reliable methodology to operationalise these constructs ?

Boyd, Dess, and Rasheed (1993) offer an answer to the first question. Their study reviewed previous theoretical and empirical research on environmental measurement, and developed a framework to explain both the causes and consequences of divergence between archival and perceptual measures of the environment. Typically, objective environmental measures rely on archival sources and include indicators such as growth in industry sales and concentration ratios. Note that Boyd, Dess, and Rasheed (1993) refer to objective measures as archival measures because they argue that objective measures always entail some element of subjectivity. Perceptual environmental measures, in comparison, entail the subjective judgments of the environment by organisation members or key informants.

Boyd, Dess, and Rasheed's (1993) review indicates that archival and perceptual measures of environment differ at both theoretical and measurement levels. Consequently, tests of hypotheses may yield very different or inconsistent results, depending on the approach used to conceptualise environment. A number of limitations and problems associated with using archival measures (i.e. data aggregation, recency, and correspondence) and perceptual measures (i.e. generalisability, reliability and validity, and source of variation) and more generally, a problem of use of inconsistent labels were highlighted.

Boyd, Dess, and Rasheed (1993) propose two core explanations for the divergence between archival measures and perceptual measures: level of analysis and mediating filters. Archival measures are generally operationalised at the broader industry level, whereas perceptual measures of the environment typically use the individual respondent as the unit of analysis, and focus on the narrower firm or subunit level. Refer to Figure 6 below. These different levels of analysis for archival and perceptual measures are represented in Figure 6 below.

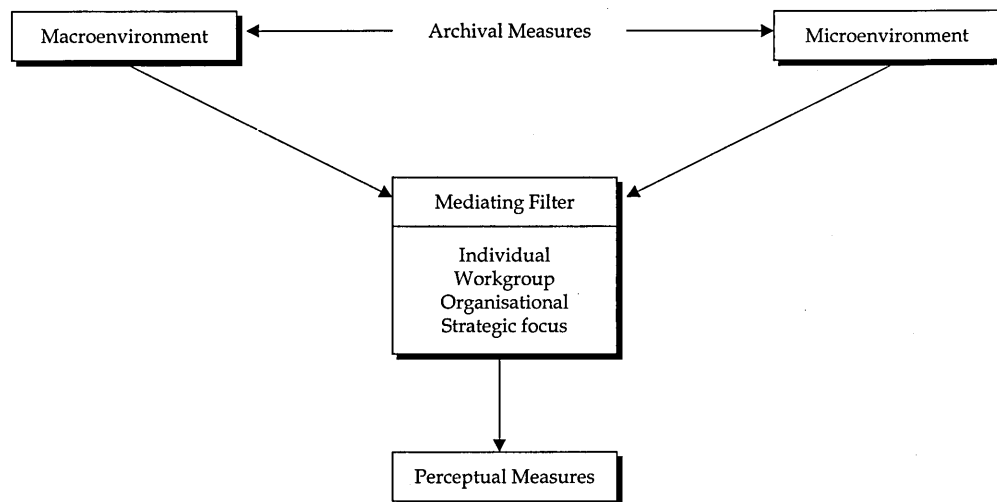
Figure 6: Levels of environmental measurement.



Source: Boyd, B.K., Dess, G.G, & Rasheed, A.M.A. (1993) "Divergence between archival and perceptual measures of the environment: Causes and consequences. *Academy of Management Review* 18-204-226.

Mediating filters between archival and perceptual measures are proposed to include individual cognitive factors, variables at the workgroup and organisational levels, and the strategic focus of the firm. Refer to Figure 7 below.

Figure 7: General model of environment



Source: Boyd, B.K., Dess, G.G, & Rasheed, A.M.A. (1993) "Divergence between archival and perceptual measures of the environment: Causes and consequences. *Academy of Management Review* 18-204-226.

Individual mediating factors subject to prior empirical research include:

- cognitive biases and systematic errors (Hitt & Barr, 1989; Michael, 1973; Downey & Slocum, 1975);
- ambiguity tolerance (Downey & Slocum, 1975; Duncan, 1972; Gifford, Bobbitt, & Slocum, 1979; McCaskey, 1976);
- cognitive complexity (Downey, Hellriegel, & Slocum, 1977; Lorenzi, Sims, & Slocum, 1981; Hunsaker, 1973); and
- choice of communication media (Daft & Lengel, 1984; Fulk & Boyd, 1991; Blandin & Brown, 1977; Daft, Sormunen, and Parks., 1988; Ireland, Hitt, Bettis, and de Porras, 1987; Jones, Saunders, & McLeod, 1988-89).

Workgroup mediating factors featured in prior studies include:

- proximity of a workgroup to the organisational boundary (Dean & Brass, 1985) or boundary spanning activity (Leifer & Huber, 1977);
- composition of the top management team (Hambrick & Mason, 1984); and
- factors such as demographic characteristics which in turn influence values and cognitive bias, and the degree of homogeneity within top management teams (Janis, 1972).

Organisational mediating factors previously researched include:

- organic versus mechanistic structures (Leifer & Huber, 1977; Huber, O'Connell, & Cummings, 1975);
- inertia leading to an increased tendency to rely on internal versus external communication (Katz, 1982) and reduced adaptability and innovation (Aldrich, 1979; Lodahl & Mitchell, 1980); and
- presence of slack (Thompson, 1967; Galbraith, 1973) linked with complacency by management (Bourgeois, 1980).

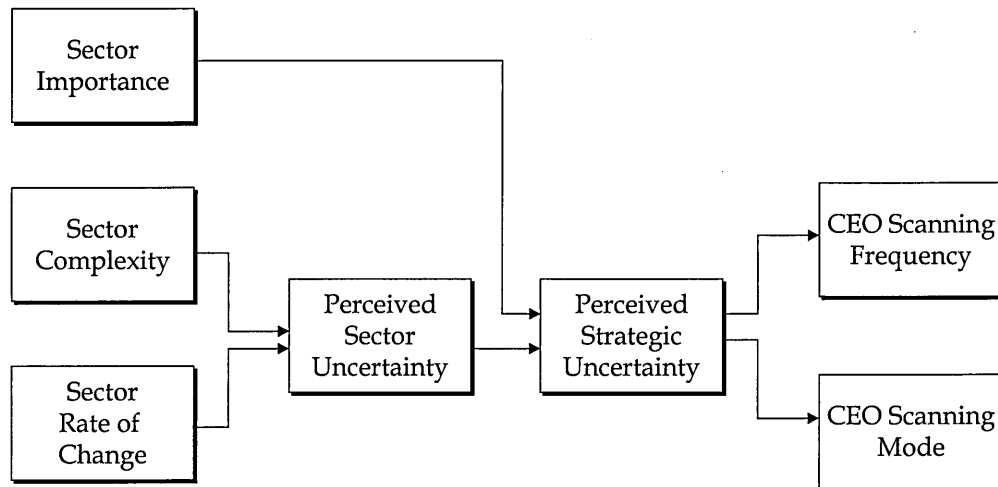
Strategic factors postulated to mediate between archival and perceptual measures of the environment include: basic elements of corporate strategy including definition of domains and competitive posture (Bourgeois, 1980); choice of strategy such as analyzer, prospector, defender, and reactor according to the Miles and Snow (1978) typology; or cost leadership, differentiation, or focus according to the Porter (1980) generic strategies typology.

In terms of guidelines for the relative appropriateness of archival versus perceptual measures, Boyd, Dess, and Rasheed (1993) offer the following. First, archival measures are best suited for measuring external constraints on organisations. Thus, researchers who focus on firm outcomes (e.g. population ecology, resource dependence) would benefit most from use of archival measures. Similarly, those studies of firm actions, such as executive information search of decision making, would benefit most from use of perceptual measures. Further, researchers who examine matching between organisations and environments would benefit from collecting both types of data.

As this research is a study of individual managers' environmental scanning behaviour, the use of perceptual measures appears to be the most appropriate. This addresses the first question referenced earlier on whether the objective environmental construct or the perceived environmental construct is the most relevant for a particular piece of research. As to the second question (i.e. what is valid and reliable methodology to operationalise these constructs ?), the study by Daft, Sormunen, and Parks (1988) provides an example in which a set of perceptual environmental measures were operationalised in the context of studying scanning behaviour.

Daft, Sormunen, and Parks (1988) interviewed chief executives in 50 manufacturing companies about the perceived strategic uncertainty in six environmental sectors, and the frequency and mode of scanning used for each sector. Three major interpretations were drawn: 1) sectors differed widely in the amount of strategic uncertainty created for chief executives, and customer, economic, and competition sectors had greater strategic uncertainty than technological, regulatory and socio-cultural sectors; 2) chief executives responded to perceived strategic uncertainty across sectors with greater scanning frequency in all modes, and somewhat greater use of personal compared to written modes, and 3) chief executive scanning in higher-performing firms was characterised by more frequent scanning and by careful tailoring of scanning to perceived strategic uncertainty compared to chief executives in lower-performing firms. Refer to Figure 8 below.

Figure 8: Model of chief executive scanning behaviour.

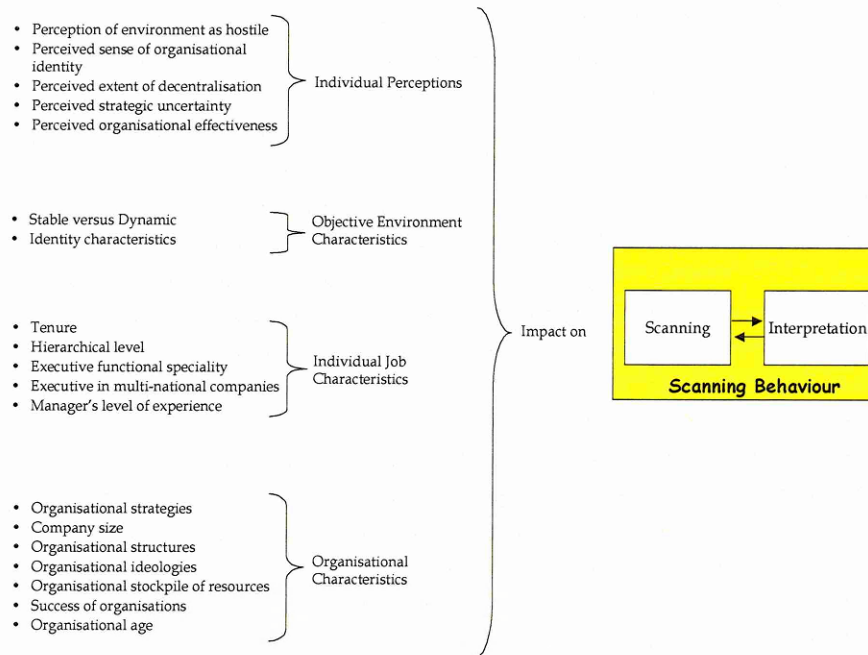


Source: Daft, R.L., Sormunen, J., & Parks, D. (1988). "Chief executive scanning, environmental characteristics, and company performance. An empirical study." *Strategic Management Journal*, 9: 123 - 139.

2.2.4 Influences on Scanning Behaviour

Many empirical studies have been carried out that test the influence or relationship between a wide range of variables and the inter-related tasks of scanning and interpretation. Figure 9 below identifies 19 of these variables and groups them into four broad categories – individual perceptions, objective environmental characteristics, individual job characteristics, and organisational characteristics.

Figure 9: Variables theorised to influence scanning and interpretation tasks



The above variables were identified from reviewing the following papers: stable versus dynamic environment (Kefalas and Schoderbek, 1973); hierarchical level (Aguilar, 1967; Kefalas and Schoderbek, 1973); executives functional specialty (Aguilar, 1967; Kefalas and Schoderbek, 1973; Dearborn & Simon, 1958; Walsh, 1988; Bowman & Daniels, 1995); executives in multinational companies (Keegan, 1974); organisational strategies (Hambrick, 1982; Jennings & Lumpkin, 1992); perceived strategic uncertainty by environmental sector (Daft, Sormunen, & Parks, 1988); manager's level of experience (Aguilar, 1967); company size (Aguilar, 1967; Kimberly & Miles, 1980); perceived extent of decentralisation (Milliken, 1990); organisational structures (Meyer, 1982); organisational strategies (Meyer, 1982); organisational ideologies (Meyer, 1982); perceived organisational effectiveness (Milliken, 1990); perceived sense of organisational identity (Milliken, 1990); organisational stockpiles of resources (Meyer, 1982); industry characteristics (Aguilar, 1967; Pfeffer & Salancik, 1978; Dess, Ireland, & Hitt (1990); tenure (Gabarro, 1987; Miller, 1991); success of organisations (Tushman & Romanelli, 1985); perception of environment as hostile or threatening; and organisational age (Kimberly & Miles, 1980).

Although research efforts into scanning and interpretation process have identified a myriad of influencing factors, the collective findings of these studies are still far from adequate to understand the environmental scanning and interpretation process at an individual level. This is further commented on in Section 2.5, Research Gap.

2.3 Strategy and Strategy Process

This section provides background information to the concept of competitive advantage by referencing two frequently cited typologies of strategy formulation processes, reviewing the categorisation of strategy into strategy content versus strategy process, considering the domains of strategy, and finally discussing the concept of competitive advantage. An understanding of the concept of competitive strategy and strategy processes was helpful to inform a subsequent proposition on the relationship between different types of scanning behaviour and perceived organizational strategy types.

2.3.1 Strategy Perspectives

By way of background information to the concept on competitive advantage, this section will outline two frequently cited typologies of strategy formulation processes proposed by Chaffee (1985) and Mintzberg (1990). This background is relevant for two reasons. First, the types of strategy formulation processes that organisations adopt will likely impact individual senior managers scanning behaviour (Hambrick, 1982). This will occur as different strategy formulation processes influence organisational aims and associated performance measures which in turn influence the strategic behaviours of the individuals within the management team (Chaffee, 1985). Second, it is proposed that when interviewing managers, they will interpret the concept of scanning the environment in the context of their knowledge about strategy formulation processes. Therefore, understanding different strategy perspectives is helpful to understand individual manager's interpretations of strategy process and the role of scanning in connection with that process.

Chaffee (1985) proposes there to be three models of strategy – Linear, Adaptive, and Interpretative. Model 1, Linear strategy, focuses on planning and consists of integrated decisions, actions, or plans that will set and achieve viable organisational goals. Linear strategy is inherent in Chandler's (1962) definition of strategy – "Strategy is the determination of the basic long term goals of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals" (Chandler, 1962: 13). Terms associated with the linear model include strategic planning, strategy formulation, and strategy implementation. Two major assumptions underlie the linear model. A first assumption is that if a sequential planning process is to succeed, the organisation needs to be tightly coupled, so that all decisions made at the top can be implemented throughout the organisation. A second assumption arises from the time consuming and forward looking nature of planning. In order to justify the time and resources required to do "up front" strategic planning, management must assume that either the environment is relatively predictable or that the organisation is well-insulated from the environment. Major characteristics of the linear model and the names of several authors whose definitions of strategy are consistent with this model are listed in Appendix H, Summary of Linear strategy, Adaptive strategy, and Interpretative strategy.

Model 2, Adaptive strategy, is typified by Hofer's (1973) definition characterising it as "concerned with the development of a viable match between the opportunities and risks present in the external environment and the organisation's capabilities and

resources for exploiting these opportunities". The adaptive model differs from the linear model in several ways. First, monitoring the environment and making simultaneous and continuous adjustments is a function of the adaptive model. Second, the adaptive model does not deal as emphatically as the linear model with decisions about goals. Instead, it tends to focus the manager's attention on means, and the "goal" is represented by coalignment of the organisation with its environment. Third, the adaptive model's definition of strategic behaviours goes beyond that of the linear model to incorporate not only major changes in products and markets, but also subtle changes in style, marketing, quality, and other nuances (Hofer, 1976; Shirley, 1982). Fourth, a difference follows from the relative unimportance of advanced planning in the adaptive model. Thus, as may be expected, strategy is less centralised in top management, more multifaceted, and generally less integrated than in the linear model. And fifth, in the adaptive model the environment is considered to be a complex organisational life support system, consisting of trends, events, competitors, and stakeholders. The boundary between the organisation and its environment is highly permeable, and the environment is a major focus of attention in determining organisational action. Major characteristics of the adaptive model and the names of several authors whose definitions of strategy are consistent with this model are listed in Appendix H, Summary of Linear strategy, Adaptive strategy, and Interpretative strategy.

Model 3, Interpretative strategy, parallels developments in corporate culture and symbolic management outside the strategy literature. This model is based on a social contract, rather than an organismic or biological view of the organisation (Keeley, 1980). The social contract view portrays the organisation as a collection of cooperative agreements entered into by individuals with free will. The interpretative model of strategy further assumes that reality is socially constructed (Berger & Luckmann, 1966); that is, reality is defined through a process of social interchange in which perceptions are affirmed, modified, or replaced according to their apparent congruence with the perceptions of others. Strategy in the interpretative model might be defined as orienting metaphors or frames of reference that allow the organisation and its environment to be understood by organisational stakeholders. Interpretative strategy, like adaptive strategy, assumes that the organisation and its environment constitute an open system. But in interpretative strategy the organisation's leaders shape the attitudes of participants and potential participants toward the organisation and its outputs; they do not make physical changes in the outputs. Major characteristics of the interpretative model and the names of several authors whose definitions of strategy are consistent with this model are listed in Appendix H, Summary of linear strategy, adaptive strategy, and interpretative strategy.

An alternate set of strategy perspectives, ten schools of strategic thought, are proposed by Mintzberg (1990). These ten schools are as follows: 1) the design school – strategy formation as a conceptual process; 2) the planning school – strategy formation as a formal process; 3) the positioning school – strategy formation as an analytical process; 4) the entrepreneurial school – strategy formulation as a visionary process; 5) the cognitive school – strategy as an ideological process; 6) the learning school – strategy formulation as an emergent process; 7) the political school – strategy formulation as a power process; 8) the cultural school – strategy formulation as an ideological process;

9) the environmental school – strategy formation as a passive process; and 10) the configurational school – strategy formation as an episodic process.

Mintzberg (1990) organises these schools into three groupings as follows. The first three schools are prescriptive in nature – more concerned with how strategies should be formulated than with how they necessarily do form. The first of these, the design school, focuses on strategy formulation as a process of informal design, essentially one of conception. The second school, formalised that perspective, describing strategy formation as a more detached and systematic process of formal planning. And the third school, the positioning school, while still prescriptive, differs from the prior two schools in that it is less concerned with the process of strategy formation per se than with the actual content of strategies – it focuses on strategic positions considered generically.

The six schools that follow focus on specific aspects of the process of strategy formulation and are less concerned with describing ideal strategic behaviour than with describing how strategies do get made. The entrepreneurial school reflects strategy formation as an entrepreneurial process in which strategy is associated with the vision of the leader. Continuing to adopt an individual perspective, the cognitive school reflects strategy formulation as the process of concept attainment as a single mind and accordingly seeks to enter the strategist's mind by extracting the messages of cognitive psychology. The next four schools open up the process of strategy formulation beyond the individual and his or her cognition, to other forces and other actors. According to the learning school, the world is too complex to allow strategies to be developed all at once as clear plans or visions; hence strategies must emerge in small steps, as the organisation adapts or "learns". The political school describes strategy formulation as a process of exploiting power, whether by groups in a conflictive process within organisations or by organisations themselves with regard to their external environments. In contrast, the cultural school depicts strategy formulation as a fundamentally collective and cooperative process. And proponents of the environmental school believe that strategy formation is a passive process and that power over it rests not in the organisation but in its environment. Accordingly, they focus their attention on the power and the nature of environments that surround organisations.

The final proposed school of strategy is that of configuration. This school combines the others into a single perspective – writers of this school cluster the elements and behaviours of organisations – strategy making processes, content of strategies, and structures and/or contexts – at different stages in their histories.

In the development of a proposition connecting strategy process and scanning behaviour, an effort was made to identify a small set of strategy processes that were substantially different from one another. It was expected that this would increase the chance of identifying differences in scanning behaviour resulting from different strategy process contexts. The three strategy processes selected to form part of the proposition connecting strategy process and scanning behaviour were planning strategy, visionary strategy, and emergent strategy. These equated to Mintzberg's (1990) processes from the planning school, the entrepreneurial school, and the learning

school. Two of the strategy processes selected for incorporation into a proposition, planning and emergent strategy, could also be equated to Chaffee's (1985) Linear strategy and Adaptive strategy.

2.3.2 Strategy Content versus Process

This section comments on a further categorisation of strategy into strategy content versus strategy process. This categorisation informed the development of a subsequent proposition connecting strategy and scanning behaviour. In the subsequent proposition a strategy process versus strategy content perspective was adopted. As discussed below in Section 8.1, adopting this strategy process perspective represented a contribution to management research with respect to research on environmental scanning.

In the field of business policy, the normative works of several writers (Ackoff, 1970; Andrews, 1971; Ansoff, 1965; Katz, 1970; Vancil & Lorange, 1975) have typically instructed managers on how to formulate strategy by scanning the firm's environment to seek opportunities that could be matched with the firm's capabilities. This instruction was typically followed by a primer on organisation design and on the selection of "competitive weapons" and allocation of resources. The descriptive literature (Allison, 1971; Bower, 1970; Chandler, 1962; Cyert & March, 1963) has tended to rely on case analyses to explain how strategy is "really" formed. Both approaches have focused almost exclusively on the strategy formulation process.

Other research in business policy, has centered on identifying which sets of strategies seem to enable business firms to achieve economic success (Buzzell, Gale, & Sulton, 1973; Glueck, 1976; Hatton et al., 1978; Hofer, 1973; Lenz, 1978; Ward, 1976; Wrigley, 1970). This type of research has been characterised as the "content" approach to studying strategy, because it focuses on the make up of strategies actually implemented.

Whether research focuses on content or process usually reflects the disciplinary orientation of the investigator. For example, an economics orientation is usually concerned with what decisions are made rather than how they are made. This is in contrast to the orientation of behavioural scientists which usually focuses on the process of decision making. This research falls into the strategy process category as it is fundamentally a study of an aspect of managerial behaviour i.e. one of the initial activities undertaken in the strategy formulation process (Bower & Doz, 1977). While this research is within the strategy process category, it is also directly relevant to marketing strategy as scanning the business environment is an integral input into marketing planning (McDonald, 2002).

2.3.3 Domains of Strategy

This section comments on a further categorisation of strategy based on strategy hierarchy (Bourgeois, 1980). Vancil and Lorange (1975) introduced the concept of corporate/business strategy hierarchy and defined the portfolio selection and business competition orientations. Among the many definitions of strategy, there are two primary purposes: first, to define the segment of the environment in which the organisation will operate, and second, to provide guidance for subsequent goal-directed activity within that niche. These two purposes form the basis for specifying the following hierarchical definition of strategy:

Domain definition strategy – refers to the organisation’s choice of domain or change of domain that occurs when, for example, a firm diversifies into or exits from particular products or markets. Miles and Snow’s (1978) “entrepreneurial problem” is of this type, as are Chandler’s (1962) “strategic decisions”.

Domain navigation strategy – refers to competitive decisions made within a particular product-market (e.g. industry), or task environment. Thus, once a domain or competitive arena has been determined by primary strategy, the organisation is subject to the environmental constraints to which the contingency theorists attribute primacy. This level then includes Churchman’s (1968) “missions”, Ansoff’s (1965) “administrative decisions”, Chandler’s (1962) “entrepreneurial decisions”, Uytterhoeven’s (1973) “competitive weapons”, and Hofer’s (1973) “distinctive competencies”.

This research is positioned at the domain navigation strategy level for the following reason. The majority of respondents in this research were senior managers at the first tier, second tier, and third tier who are not concerned with domain definition decisions and associated scanning on a regular basis. Domain definition decisions are typically fulfilled by chief executives (Hambrick, 1982; Ritvo, Salipante, and Notz, 1979). Thus, the majority of the research data captured on scanning behaviour will be in the context of domain navigation or secondary level strategy making.

2.3.4 Competitive Advantage

This section comments on the concepts of competitive advantage and sustainability of competitive advantage. Understanding these concepts is helpful to inform a subsequent proposition and discussion on the relationship between different types of scanning behaviour, types of strategy processes, and organisational performance.

Understanding sources of sustained competitive advantage for firms is a major area of research in the field of strategic management (Porter, 1985; Rumelt, 1984). A common description of competitive advantage suggests that firms obtain advantage by implementing strategies that exploit their internal strengths, through responding to environmental opportunities, while neutralising external threats and avoiding internal weaknesses. Most research on sources of sustained competitive advantage has focused either on isolating a firm’s opportunities and threats (Porter, 1980, 1985), describing its

strengths and weaknesses (Hofer & Schendel, 1978; Penrose, 1959; Stinchcombe, 1965), or analysing how these are matched to chosen strategies.

Drawing on Barney (1991), a firm is said to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors. A firm is said to have a *sustained* competitive advantage when it is implementing a value creating strategy that other firms are unable to duplicate. Other firms are assumed to include not only all of its current competitors, but also potential competitors poised to enter an industry at some future date (Baumol, Panzar, and Willig, 1982; Barney, McWilliams, & Turk, 1989).

Some authors have suggested that a sustained competitive advantage is a competitive advantage that lasts a long period of calendar time (Jacobsen, 1988; Porter, 1985). Other views are a competitive advantage is sustained only if it continues to exist after efforts to duplicate that advantage have ceased. This view therefore distinguishes between a loss of competitive advantage due to unanticipated changes in the economic structure of an industry – or “Schumpeterian shocks” (Barney, 1986; Rumelt & Wensley, 1981; Schumpeter, 1934, 1950) – and loss of competitive advantage nullified through competing firms duplicating the benefits of that competitive advantage.

Barney (1991) argues that firms cannot expect to “purchase” sustained competitive advantages on open markets, but rather that such advantages must be found in the rare, imperfectly imitable, and non-substitutable resources already controlled by a firm (Dierickx & Cool, 1989). Barney (1991) contends that superior information and luck play a role; that firms may obtain above normal returns only when they have superior information, when they are lucky, or both. It is argued that all other apparent sources of either quasi-rents or market power ultimately boil down to either superior information or luck. Dutton and Freedman (1985) also argue that superior information may confer competitive advantage – “proprietary control of information is a primary element in providing management with discretion. Superior information permits management to calculate successfully vis-à-vis their competitors as well as to more rapidly assess the success or failure of their experiments” (Dutton and Freedman, 1985: 60).

This proposed conceptual link between information and the potential to confer competitive advantage is central to appreciating the importance of effective scanning practices. If it is accepted that effective scanning underlies the sound judgement essential for strategic success, then scanning may represent a “dynamic capability” for the firm (Teece, Pisano, and Shuen, 1997; Eisenhardt and Martin, 2000). It also prompts a question about the relationship between scanning behaviour and strategy processes. While superior information may potentially confer competitive advantage, the realisation of advantage is dependent on management making assessments ahead of decisions e.g. performing calculations relative to their competitors, assessing the outcomes of experiments etc. This may imply that in order to capitalise on the outcome of effective scanning practices there should be a clear linkage between scanning outcomes and organisational strategy processes. An analysis to understand the relationship between scanning behaviour and strategy process was undertaken and is commented upon in Sections 6.2.3 and 7.2.3 below.

2.4 Managerial Cognition

2.4.1 Bounded Rationality

This section introduces the concept of bounded rationality and references research that theorises on the impact of bounded rationality on environmental scanning behaviour.

March and Simon (1958) in recognition of cognitive limitations developed the concept of “bounded rationality”. They appeal to this principle to assert that in the discovery and elaboration of new programs, the decision-making process will proceed in stages and at no time will it be concerned with the “whole” problem in all its complexity, but always with parts of the problem. Cyert and March (1963) relate this principle to scanning and suggest that scanning represents a difficult organisational problem because the environment is vast and complex and that managers experience “bounded rationality” – they cannot comprehensively understand the environment.

This research incorporates the idea of “bounded rationality”. This limitation impacts upon managers’ ability to perform one of their key roles, “manager as monitor”, involving the identification of key external events, analyses, ideas & trends, and pressures (Mintzberg, 1973). This role positions managers as “information workers” (McCall and Kaplan, 1985) and implies that managerial cognitions play a key role in each activity that comprises the strategic decision making process including environmental scanning and interpretation (Stubbart, 1989). As “information workers” the fundamental problem faced by managers is that their information worlds are extremely complex, ambiguous, and munificent (Mason and Mitroff, 1981; Mintzberg et. al, 1976; Schwenk, 1984; Starbuck and Milliken, 1988).

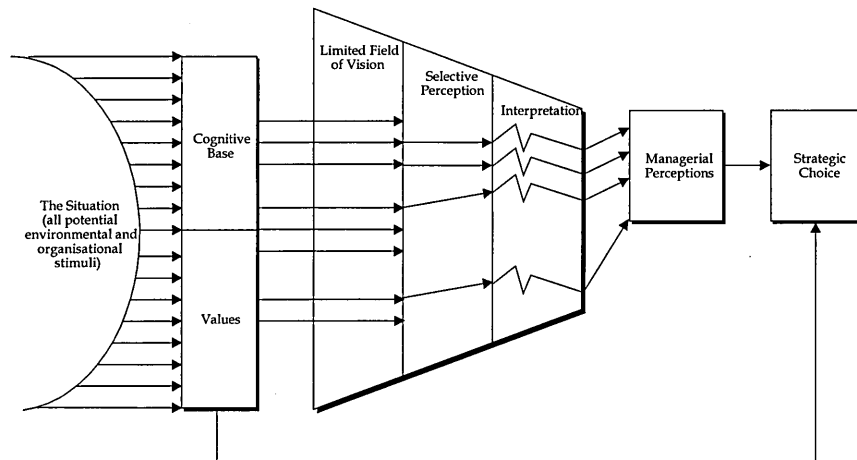
An appreciation of the concept of bounded rationality informed the type of research questions included in the survey on scanning behaviour. Specifically, respondents were asked for feedback on the extent to which they consider the environment is analysable, the scope of their environmental scanning activities, and a self-assessment of the degree of complexity associated with environmental scanning.

2.4.2 Perceptual Bias

This section introduces the concept of perceptual sets which represent a bias to perceive certain stimuli over others, references four studies that theorise on the implications of these biases on scanning and interpretation tasks, and lists ten further perceptual biases and their potential effects.

A managerial cognition view accepts that people do possess perceptual sets (Allport, 1955). Perceptual sets represent a bias to perceive particular features of a stimulus more readily than others. Dearborn and Simon’s (1958) investigation of selective perception was one of the first studies to suggest that dysfunctional decision consequences might follow the use of knowledge structures. An extract of a diagram from the Hambrick and Mason (1984) study illustrates the conditions of bounded rationality and perceptual bias introduced above. Refer to Figure 10 below.

Figure 10: Strategic choice under conditions of bounded rationality



Source: Hambrick, D.C., and Mason, P.A., (1984) "Upper Echelons: The Organization as a reflection of its top managers. *Academy of Management Review*, Vol. 9, No. 2, 193-206

With reference to conditions of “bounded rationality”, the following studies have theorised on the implications of cognitive limitations on scanning behaviour. Cyert and March (1963) theorised that “limited search” occurs when an organisation’s response to the environment leads to “adequate performance” and that environmental searching is directed toward the familiar, the convenient, and the inexpensive; Pfeffer and Salancik (1978) suggested that executives scan according to their perceptions of the necessity for information; Hambrick and Snow (1977) proposed that the organisation will narrow its future scanning to test areas that it thinks it knows how to act upon, and thus, over time, distinctive competencies become honed and the organisation’s “field of vision” draws tighter and tighter; and Spender (1981) found that actors in an industry share a common “recipe” or way of viewing the environment.

Further types of perceptual biases and their possible effects on the strategic decision making processes which encapsulate environmental scanning and interpretation tasks are as follows (Schwenk, 1984):

- prior hypothesis bias – evidence ignored, gaps not perceived;
- adjustment and anchoring – evidence under-used, gaps not perceived;
- escalating commitment – significance of gap minimised, strategy not revised;
- reasoning by analogy – problem misdefined (oversimplified), inappropriate strategy revision;
- single outcome calculation – restricts alternatives to a single one;
- inferences of impossibility – premature rejection of alternatives;
- denying value tradeoffs - biased use of evaluation criteria;
- problem sets – alternatives restricted;
- representativeness a) insensitivity to predictability, b) insensitivity to sample size, c) illusion of validity – inaccurate prediction of consequences of alternatives;

- illusion of control – inaccurate assessment of risks of alternatives; and
- devaluation of partially described alternatives – rejection of strong but poorly presented alternatives.

While the above examples may suggest that perceptual biases generally have a negative impact, Tversky and Kahneman (1974), Winkler and Murphy (1973), and other behavioural decision theorists have pointed out that they may actually improve decisions. For example, simplification processes during the goal formulation/ problem identification stage may help to provide stability in organisational strategy by ensuring that strategies are pursued consistently over time; single outcome calculations and the related processes may be necessary when there is only one politically viable strategy; and simplification during the evaluation phase may increase the chances of successful implementation by increasing decision-makers' confidence in a strategy and their commitment to it.

In this research the potential for perceptual biases or perceiving certain stimuli over others was considered. One form of perceptual bias resulting in scanning certain environmental sectors over others was tested for. Refer to section 6.2.4 and 7.2.4 for results and analysis.

2.4.3 Cognitive Structures

This section introduces the topic of cognitive structure, two streams of research in cognitive psychology – classification theories and personal construct theory – and references relevant studies that attest to the importance of cognitive structures while acknowledging the limitations of measuring the accuracy of managerial perceptions using available methodologies.

Strategic management research acknowledges the importance of cognitive frameworks in strategic decision processes (Dutton, Fahey, and Narayanan, 1983; Huff, 1990; Mason and Mitroff, 1981; Stubbart, 1986, 1987). One aspect of this cognitive research has been to consider the way in which competitors are recognised and included in the strategic decision making process (Reger, 1990; Porac and Thomas, 1990; Daniels et al., 1993; Hodgkinson and Johnson, 1994). These studies indicate that managers hold simplistic and idiosyncratic “maps” of who their competitors are, their characteristics, and likely modes of behaviour (Jenkins, 1996). “Maps” that show dimensions of categories and hierarchies among concepts have relied primarily on two approaches (Huff, 1990) – classification theories and personal construct theories.

Classification theories concentrate on categories of concepts and the hierarchical relationships among them (Johnson-Laird and Wason, 1977; Lakoff, 1987; Rosch, 1978). Personal construct theory concentrates on the key dimensions, or constructs, of human cognition (Huff, 1990). Personal construct theory was first postulated as a theory of personality (Kelly, 1955) but later adherents assign it a more limited role as a theory of cognition (Fransella and Bannister, 1977). The theory posits that bipolar constructs (or dimensions) are the primary mechanism individuals use to organise, simplify, and interpret the mass of stimuli that constantly confront them. Constructs are defined in terms of similarities and differences and are organised into systems of

meaning which individuals use to develop theories about the environment, to make predictions and guide action. Personal construct theory is predicated on the belief that individuals act on their perceptions of the objective world filtered through their constructive system. The individual does not passively perceive the environment, rather he or she actively construes (attaches meaning to) perceptions. Constructs are seen to form a somewhat flexible yet structured network that both facilitates and restricts an individual's perceptions and actions (Kelly, 1955).

Understanding personal construct theory raised awareness of the complexities of measuring managerial perceptions. This complexity was especially evident when attempting to measure perceptions in a complex natural setting. For a further discussion of this research design issue and the methodological approach adopted refer to Section 5.3, Research Design Issues.

2.4.4 Information Processing

This section reflects on some key findings of studies concerned with information processing. These studies are particularly relevant as information processing is an activity that subsumes environmental scanning.

One requirement in all organisations is that information be processed among participants (Daft and Macintosh, 1981; Arrow, 1974; Williamson, 1975). In order to interpret the external environment, coordinate activities, and handle problems that arise, participants attend meetings, send and receive reports, obtain knowledge of events relevant to performance, read printouts, make technical and administrative decisions, and perhaps disseminate instructions – all of which involve information processing in some form.

Mintzberg (1973) recognised the importance of the informational role of the manager. In his categorisation of managerial roles, informational roles are one of the three major categories; the other two being interpersonal roles and decisional roles. Within informational roles, Mintzberg (1973) identifies three sub-roles of manager as monitor, disseminator, and spokesman. The sub-role of manager as monitor encapsulates the scanning behaviour described in this research.

The view of an organisation as an information-processing entity has been subject to theoretical and empirical attention in the literature (Huber, O'Connell, and Cummings, 1975; Porter and Roberts, 1976; Connolly, 1977). Many aspects of structure and process that have been observed within organisations may reflect information processing requirements (March & Simon, 1958; Katz & Kahn, 1966; Weick, 1969; Roberts et al., 1974). For example, Tushman and Nadler (1978) proposed that organisational effectiveness is a function of the fit between the uncertainty caused by several task characteristics and the ability of an organisation to provide participants with required information.

This concept of uncertainty has been extended to consider the relationship between environmental turbulence and the resulting creation of uncertainty, and type of strategy. Theorists have suggested that the most appropriate way to respond to

environmental turbulence is with an adaptive organisation – one with flexible roles, decision making at multiple levels, and widespread formal and informal communication (Thompson, 1967; Weick, 1969). If work-related communication is one way of dealing with information processing requirements, then environmental variability may be dealt with effectively through increased communication (Glanzer & Glaser, 1961; Taylor & Utterback, 1975). Daft and Lengel (1984) classified communication media used by managers on a continuum of “media richness” – an ability to resolve ambiguity and facilitate understanding. Richness is a function of four factors: speed of feedback, variety of communication channels employed, personalness of source, and richness of language.

Of particular interest to this research is whether particular organisational tasks – such as scanning the environment – require different levels of information processing. Empirical studies have indicated that, in general, complex, non-routine tasks require more information processing than simple, routine tasks. This relationship has been observed in small groups (Bavelas, 1950; Leavitt, 1951), simulated organisations (Becker and Baloff, 1969), research and development groups (Tushman, 1978, 1979), and employment security agency subunits (Van de Ven and Ferry, 1980).

A key concept proposed and re-tested in the information processing literature is that uncertainty and the amount of information processed are closely related. This relationship is the basis for theories that relate task uncertainty to structure (Galbraith, 1977; Tushman and Nadler, 1978) and is supported by empirical literature (Tushman, 1978, 1979; Van de Ven and Ferry, 1980), although other results are equivocal (Daft & Macintosh, 1981).

Burns and Stalker (1966), Negandhi and Reimann (1973), and Miller (1971) report that for turbulent task environments, successful organisations are characterised by intense and diverse communication. Similarly, Duncan (1973) and Lawrence and Lorsch (1967) found that high performing departments facing a changing environment reported more communication than did high performing departments in stable environments. Other research studies suggest that financial performance is strongly correlated with the use of informal channels of communication and is modestly correlated with the number of information items used (Grinyer and Norburn, 1975). However, it would not be accurate to claim that scanning leads directly to company performance, because performance is influenced by a number of factors (Hirsch, 1975; Kanter and Brinkerhoff, 1981; Hambrick, 1983; White and Hammermesh, 1981).

Implications of these findings for this research included an awareness that uncertainty experienced by an individual manager may influence the mode of scanning behaviour adopted, that is, the greater uncertainty the more organised and intense the information gathering activity. Other factors that may influence scanning such as the routineness of tasks typically undertaken by managers and the level of information processing required according to job role were captured in this research and subsequently analysed.

2.5 Research Gap

Based on this review of the literature in the areas of environmental scanning, strategy, and management cognition, three major findings emerge that illustrate a research gap. First, there is a current gap in understanding of scanning behaviour at the individual level due to the small number of empirically based research efforts undertaken concerning scanning and the lack of recent research effort focused on the phenomenon of environmental scanning. The last substantive study focusing solely on scanning was undertaken by Aguilar (1967). As Aguilar's (1967) study was done over 30 years ago, and in light of the substantial changes in technology and information management since then, the need for an updated understanding of scanning is clear.

Second, there is an increased acceptance, especially in light of the increase in rate of environmental changes, that an understanding of the business environment is a critical input into strategy formulation processes and may represent a "dynamic capability" leading to more informed decision making.

Third, there is a need to revisit conceptually and empirically the proposed influences on scanning behaviour in order to better understand this phenomenon. This includes empirically testing the associations between traditionally proffered influencing variables and revisiting the validity of the operationalisation of scanning behaviour itself. This may, in part, lead to a more in-depth understanding of scanning behaviour and help to discern why two or more organisations can be differentially effective even though the environmental changes they face are virtually the same. An additional test of the potential influence of post graduate education in business and management on scanning behaviour was also undertaken in this research. This additional test was proposed on the basis that an intensive educational experience that emphasises adopting an external market orientation and reinforces the strategic importance of information may influence how managers' scan. Specific examples of calls for further research drawn from the literature are identified below.

Anderson & Pain (1975) testify to a general lack of systematic and in-depth research into environmental scanning and interpretation processes from a business policy perspective. They argue that while the normative literature in policy has long stressed the need to scan and assess the environment for subsequent matching of opportunities with organisational capabilities and managerial desires, business policy research has not substantially utilised or extended the systematic research dealing with environmental characteristics and their effects, whether behavioural or physical.

Pfeffer and Salancik (1978) drew a similar conclusion following their review of the literature on organisation and environment relationships. They concluded that scanning is a key topic for explaining organisational behaviour, yet practically no research had been reported on environmental scanning processes.

Hambrick (1982) also commented on the limited in-depth research undertaken concerning scanning: "It is generally recognized that organisations must adapt to their environments in order to survive and prosper. However, only limited research has been done on how environmental events and trends become known to decision makers, that

is, how executives “scan” their organizations’ environments. And, almost nothing is known about how environmental scanning practices of executives relate to their organisations’ differential means of competing, that is, their strategies. For example, it is not clear whether two firms in the same industry, but with different competitive strategies, respond differently to new environmental trends because they are unequally attuned to those trends or because their analyses of the trends lead them to different choices.” (Hambrick, 1982: 159).

Daft, Sormunen, and Parks (1988) note that while a number of studies have explored the fit between organisation and environment, there is less knowledge about how impressions of the environment are formed among top managers who are responsible for responding with new strategies and structures.

Milliken (1990) states that although management researchers have many theories that emphasise the importance of the environmental scanning and interpretation processes, relatively few studies have examined those processes. Milliken (1990) argues that it is important to try to examine empirically how organisational sensemaking and response systems work; that such research may improve our understanding of some of the reasons why organisations fail to adapt effectively to environmental changes.

Huff (1990) concurs that there is potential for further research regarding manager’s interpretation of the environment about what is attended to and how these elements of the environment are categorised and evaluated. Continuing the call for further research regarding managerial interpretation, Waller, Huber, & Glick (1995) highlight that little, if any, empirical work has been done on the determinants of what executives perceive.

Reger & Palmer (1996) state that “additional consideration of environmental effects on cognitive change is needed ... the nature of environmental changes that trigger cognitive reappraisals must be explicated. For instance, the type, intensity, or rate of environmental change might affect whether and how new environmental information is processed ... research is needed to address how various types of environmental change become incorporated into controlled and automatic processing “ (Reger & Palmer, 1996: 36).

Daft & Weick (1984) acknowledge that “ there is also little understanding of the interpretation process and the organizational configuration that may enhance interpretation ... a model of interpretation system characteristics may provide a stimulus for future research into scanning and interpretation processes” (Daft & Weick, 1984: 285).

More recently, Garg, Walters, & Priem (2003) identified the need for additional research into scanning: “Surprisingly, executive scanning emphasis has received less empirical attention from researchers than have some other areas – such as planning, analysis, strategy or decision making – for which scanning is an influential antecedent. Relatively little is known about whether a firm’s context may influence the particular sectors of the external environment to which an executive’s attention may be drawn, or

about how scanning emphasis on particular sectors may be associated with firm performance.” (Garg, Walters, & Priem, 2003: 726).

As outlined previously, this research seeks to provide an updated in-depth understanding of the phenomenon of scanning behaviour, to test a set of independent variables for their strength of influence on scanning behaviour, and to consider the implications for organisations on how to more effectively scan both the task and remote environments. This aim is consistent with the types of calls for further research outlined above and therefore positions this research to make a contribution to knowledge in this field of management.

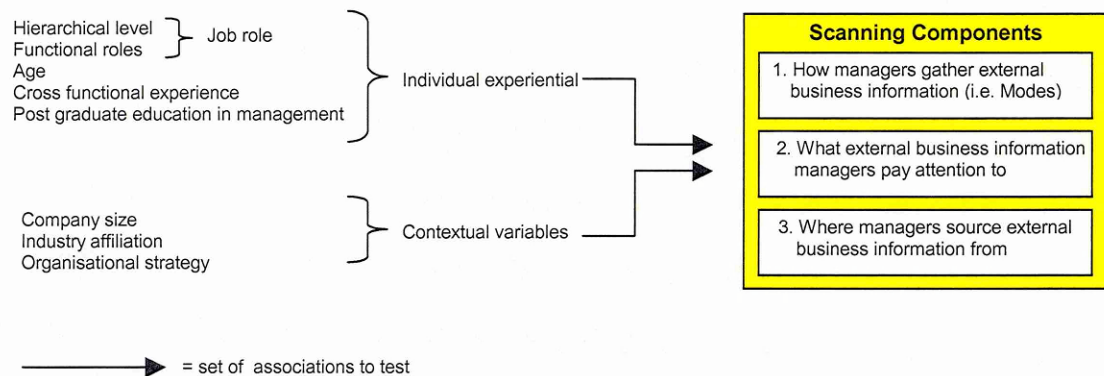
3. Theoretical Framework

The concepts embraced in the research objectives are represented in the theoretical framework represented in Figure 11. This theoretical framework is the initial framework used to conceptualise and structure the various tests and analysis within this research. Based on the actual results of the tests and analysis of these results the framework was elaborated and refined. An explanation of the impact of the analysis on evolving the framework is provided in Section 8.1, Summary of Contribution.

The primary phenomenon of interest in this research, scanning behaviour, is represented in the right side of the framework. The three major components are separately identified as 1) how managers gather external business information (i.e. scanning modes), 2) what external business information managers pay attention to, and 3) where managers source external business information from. These components comprehensively cover the range of scanning behaviour of interest to this research; they cover both the twin activities of data gathering and data interpretation as discussed in Section 2.2.2, Relationship of Scanning to Interpretation. The first two components relate to both data gathering and interpretative aspects, whereas the third component concerns mostly data gathering aspects.

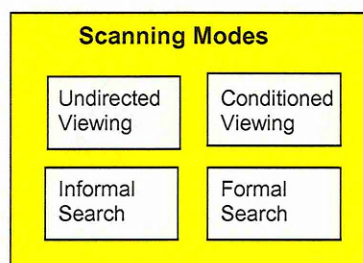
The next major item of interest to reflect in the theoretical framework is a set of potential influencing variables on scanning behaviour; this is represented in the left side of the framework. In Section 2.2.4, Influences on Scanning Behaviour, nineteen variables were identified that had been tested for their influence on scanning behaviour in prior studies. These were broadly grouped into four categories of individual perceptions, objective environmental characteristics, individual job characteristics, and organizational characteristics. For the purposes of this research, a sub-set of variables was identified for testing with respect to their influence on scanning behaviour. This sub-set of variables was identified on the basis that they had been consistently used over multiple studies or were shown to have a significant relationship to scanning behaviour (as operationalised in prior studies) i.e. this sub-set of variables represented those variables with the greatest validity and reliability on the basis of past results. Specifically, this sub-set included job role related variables (hierarchical level, functional role); other individual experiential variables (age, cross-functional experience, post graduate education in business and management); and organisational contextual variables (company size, industry affiliation, and organisational strategy).

Figure 11: Theoretical framework: Influences on managerial scanning behaviour



In addition to testing for the strength of associations between the above sub-set of influencing variables and scanning behaviour, a focused in-depth analysis and exploration of Scanning Component 1, How managers gather external business information, was undertaken. Specifically, an analysis was undertaken to further understand and test the validity of Aguilar’s (1967) four scanning modes – undirected viewing, conditioned viewing, informal search, and formal search – which equate to Scanning component 1, as represented in Figure 12. This was done in an effort to further understand and test the validity of the initial categorization of “how managers scan” proposed by Aguilar (1967). For the results and analysis of tests of the extent to which managers predominantly adopt each of these four different scanning modes and the relationship between individual experiential and contextual variables and scanning modes refer to Section 6.2.1 and 7.2.1.

Figure 12: Scanning component: Scanning modes.



A further theoretical contribution emerged following an analysis of Aguilar’s (1967) scanning modes. This contribution involved identifying significant underlying components of scanning practices. A new set of components were identified concerning scanning behaviour and scanning attention using principal components analysis. The derivation of these components is discussed in detail at Section 6.2.5, Scanning Behaviour Components, and Section 6.2.7, Scanning Attention Components. The impact of these components on evolving the above theoretical framework is summarised in Section 8.1, Summary of Contribution.

4. Research Objectives

4.1 Research Objectives

The overriding objective of this research was to provide an updated and more in-depth understanding of the phenomenon of scanning behaviour and influences on it. This research was therefore concerned with the way in which senior managers set about gaining information about events and trends in the environment outside the organisation. The nature of this research effort was essentially exploratory in order to better understand scanning behaviour as a precursor to being able to prescribe how to meaningfully influence scanning behaviour.

Several sub-objectives were elaborated as follows. The first sub-objective was to obtain a detailed understanding of the individual scanning behaviour of senior managers. This research focused on the individual scanning behaviour of managers versus on scanning practices at the organisational level. This focus was consistent with appreciating that scanning is one of a small set of primary managerial roles. As such, an in-depth understanding of this managerial role is dependent upon an in-depth analysis at the individual level. Specifically, senior managers were the target group for this research based on the assumption that they (i.e. top three tiers of managers) were those most likely to significantly influence critical decision making and strategy formulation processes. Focusing on senior managers resulted from an interest in ultimately linking scanning behaviour with decision making and strategy processes which logically should impact upon firm performance.

The second sub-objective was to attempt to identify what influences scanning behaviour at an individual level. This sub-objective has been the pre-occupation of many prior scanning studies, as overviewed in Section 2.2.4, Influences on Scanning Behaviour. This sub-objective was important to pursue as many of the prior studies reported inconclusive results with respect to the strength of influence of various variables on scanning behaviour. An understanding of how to meaningfully influence scanning behaviour is predicated on firstly understanding the strength and impact of various influencing variables upon scanning behaviour.

The third sub-objective was to consider the implications of an improved understanding into individual managerial behaviour. An improved understanding of scanning behaviour at the individual level is likely to reveal differences in terms of how managers scan, what they pay attention to, and where they source information from. In other words, what is expected to emerge is a set of differentiable behaviours or biases in terms of how managers scan. Some consideration of the potential implications of these biases will be offered. For example, implications for the type of environmental information paid attention to, the variability of information sources utilised, the depth of information attended to, the degree of analysis undertaken etc. Understanding these biases or preferences, and the extent to which these represent transient habits or embedded routines, will be helpful to developing recommendations on how to improve the overall scanning effectiveness among a team of top managers.

Sub-objective number four was to assess to the collective state of management researchers' knowledge of scanning through contrasting the findings of this research with all major prior scanning studies. This objective emerged as a result of the literature review which highlighted that few studies had focused exclusively on the phenomenon of scanning and that while there seemed to be some degree of overlap in terms of major influencing variables tested (e.g. functional role, hierarchy, size of company etc.) there were no recent studies that had collectively assessed these variables.

Finally, the fifth sub-objective was to consider the implications for organisations on how to more effectively scan both the task and remote environments. This last objective represented a broadening of the scope of this research. This broadening of the scope, based on the empirical results and analysis of individual level scanning behaviour, involved stating some further considerations and hypotheses from an organisational perspective. Adopting an organisational perspective and researching how managerial behaviour may be co-ordinated and coupled with strategy processes would seem to be a natural direction in which to extend future scanning research.

4.2 Research Assumptions

There are a set of assumptions underlying the propositions explored here. These assumptions concern who assumes a critical scanning role in the organisation; the extent to which scanning is a programmed activity; the degree of heterogeneity of scanning behaviour; the link between effective scanning behaviour and organisational performance; and the practical restrictions on managers scanning behaviour.

The first assumption was that it is the first, second, and third tier managers, or senior managers, who are strategically significant scanners – they can exercise discretion as to how they scan and they influence critical decision making and strategy formulation processes. While a large number of people may span the boundary with the external environment for information (Aldrich & Herker, 1977; Leifer & Delbecq, 1978), this information is ultimately channeled into the organisation and converges at the top management level. This was consistent with Aguilar's (1967) observation that below vice presidential level, participants are not informed on issues pertaining to the organisation as a whole.

The second assumption was that scanning by individual senior managers is not a linear process, but an ongoing pattern of activity that involves simultaneously seeking data and interpreting data about the environment. This assumption differed markedly from prior studies that adopt the organisation as the unit of analysis. Studies that have adopted an organisational perspective view scanning as an activity to provide the intelligence that policy-makers use in planning, decision making and strategy formulation (Ansoff, 1979; Rhyne, 1985; Hofer and Schendel, 1978; Miles, 1982; Meyer, 1979). These studies assume a linear strategy making process at the business unit level that begins with environmental scanning which results in some assessment of risk and perception of uncertainty, followed by objective setting, or the formation of goals and targets to be achieved in the task environment; distinctive competence selection, or the choice of tools and competitive weapons with which to negotiate with

the environment; power distribution, or the determination of authority and influence relationships among organisational sub-units; resource allocation, or the deployment of financial and physical resources to carry out a strategy; and monitoring and control of outcomes, or the comparison of intended and manifested strategy contents.

The third assumption was that, to an extent, senior managers differ in the scanning mode or process by which they interpret the environment; senior managers develop specific ways to know the environment. Interpretation processes are not entirely consistent among senior managers and variations occur due to a myriad of influencing variables such as those previously identified, including hierarchical level, functional specialty, level of experience, perceived organisational effectiveness, identify, ideology, and so on.

The fourth assumption particular to this research was that scanning is a critically important activity for senior managers because effective organisations are more in tune with their environments. Daft, Sormunen, and Parks (1988) found that chief executives in high-performing companies scanned more frequently and more broadly in response to strategic uncertainty than their counterparts in low-performing companies. Pfeffer and Salancik (1978) suggest that when managers misinterpret changes in their environment or fail to notice changes that turn out to be important, they may fail to make needed adjustments to an organisation's strategy or structure. The ensuing lack of fit between the environment and the organisation's strategy or structure may result in performance declines and other types of crises (Dunbar & Goldberg, 1978; Nystrom & Starbuck, 1984; Weick, 1987).

The fifth assumption was that senior managers have both limited time and capacity to scan and interpret environmental changes. (Hambrick, 1982; Daft, Sormunen, and Parks, 1988; and Waller, Huber and Glick, 1995).

4.3 Propositions

Eight propositions were developed in order to guide this research effort. The propositions originated from a review of the theoretical framework and consideration of how to enquire into the phenomenon of interest (i.e. managerial scanning behaviour) and how to test the significance of selected influencing variables on scanning behaviour. The selected influencing variables were categorised into job role, individual experiential, and organisational contextual variables. Some further input into the development of the propositions also came through analysing the outcomes of the pilot study.

In Section 6.2, Proposition Results, there is a full description of the rationale underlying each proposition. In this research, the term proposition is used to describe either a specific line of research enquiry or an area of research interest. Within some propositions or research areas, it was possible to develop a very specific test. For example, within the first proposition concerning scanning modes, a specific test was undertaken to test whether scanning modes were equally adopted among managers. In this case, the test was so specific that it could be formulated into a hypothesis; a null hypothesis was stated and subsequently accepted or rejected. In other cases,

propositions were more generally stated and reflected an area to investigate. For example, the fifth proposition concerned an analysis to determine whether a set of significant underlying components of scanning behaviour could be identified. An outline of the propositions and related tests, whether they be specific or more generally exploratory, are as follows.

The first proposition concerned to what extent each of the four scanning modes, as defined by Aguilar (1967), were adopted by senior managers as their predominant mode of scanning. Based on prior research, the *a priori* assumption was that scanning modes would be somewhat equally adopted and a null hypothesis was developed reflecting this. Further exploratory analysis was also done that was closely related to the core proposition above. This additional analysis included testing for differences in scanning mode adoption between managers with and without a post graduate education in business and management. Other differences in scanning mode adoption among managers were tested according to the following criteria: size of company, hierarchy, functional roles, age, industry affiliation, and cross-functional experience.

The second proposition concerned the amount of time that individual managers spent scanning. The proposition established and tested, based on no evidence to the contrary, was that the average time spent scanning by managers grouped according to their predominant mode of scanning would not differ significantly. Similar to the first proposition, an additional set of exploratory tests were then conducted. These additional tests were closely related to the core proposition above concerning the time spent scanning by different sub-groups of managers. Sub-groups analysed included those based on size of company, hierarchical level, functional role, age, industry affiliation, cross-functional experience, and post graduate education in business and management experience.

Proposition number three concerned strategy process and scanning mode. In the survey research an effort was made to identify individual manager's perceptions of the extent to which their firm adopted a visionary strategy process, an emergent strategy process, and a planning strategy process. Managers were then stratified into three groups for each strategy process: those that answered with relatively high, medium, and low scores. The initial proposition developed and tested was that there would be no significant relationship between high, medium, and low scores on congruence with strategy process, and scanning mode adoption. This initial proposition was reasonable based on no evidence to the contrary and accordingly was directly translated into the null hypothesis for testing. Further related exploratory tests were also done on just those responses from top tier managers whose positions were 0 or 1 levels below the CEO or MD position. This was done on the basis that the relationship between a type of strategy process and scanning modes may be more significant within the top tier management group due to their familiarity and understanding regarding the organisation's strategy process.

The fourth proposition concerned the level of attention that managers paid to various sub-sectors within the environment. This research measured the degree of attention paid by each manager to each of fifteen different sub-sectors. An initial proposition was established that attention paid to these sub-sectors would be equal across the

fifteen sub-sectors. Additional exploratory analysis was also done to identify significant differences in attention paid to the fifteen environmental sectors, by different sub-groups of managers. Sub-groups of managers were based on size of company, hierarchical levels, functional roles, age, industry affiliations, different predominant scanning modes, and degree of cross-functional experience and post graduate education in business and management.

Proposition number five focused directly on the scanning behaviour of individual managers. Information on managerial behaviour was gathered through responses to a set of forty-four focused statements covering a wide range of scanning behaviour. This proposition prompted an exploratory analysis. A principal components analysis was undertaken to help identify important aspects of scanning behaviour and to identify dimensions upon which individual managers may differ in their behaviour. There were no pre-conceived notions of the number of components that may emerge. The only expectation was that some important components may emerge as the base data comprised many rated statements covering a wide range of scanning behaviour, and the underlying sample size was significant enough to confidently identify valid correlations among the rated statements. This analysis was of particular importance to this research as it could potentially provide an alternative scheme to summarise key aspects of scanning behaviour as an alternative to the scanning mode typology proposed by Aguilar (1967).

The sixth proposition concerned the use of technology to scan. The subject of technology with respect to scanning was identified as an important recent development by managers who participated in the pilot studies. Technology was defined to be internet sources including search engines, company websites, and email information subscription services. This research captured information on the frequency of use of technology and the frequency of use of three other prime sources being personal networks of individuals outside the company; traditional mediums such as television, radio, newspaper, business magazines etc.; and company personnel such as superiors, peers, and subordinates. An initial proposition that there would be no substantive differences in frequency of usage across the four sources was tested. Additional exploratory tests were conducted to discern if there were any major differences in the frequency of use among these four sources of information for different groupings of managers. The different groupings of managers were based on size of company, hierarchical level, scanning mode, functional roles, age, industry, cross-functional experience, and post graduate education in business and management.

Proposition number seven concerned scanning attention, the second component of scanning behaviour i.e. what external business information managers pay attention to. An analysis was done to determine whether the fifteen environmental sub-sectors could be summarised into just a few significant components that would meaningfully represent and describe what managers substantially pay attention to. A working proposition was that some of the environmental sub-sectors would be highly correlated with one-another and that a small set of attention related components would be identified. An exploratory analysis was then done to compare these few highly correlated factors with prior environmental categorisation schemes.

The eighth and final proposition concerned passive receipt of information, i.e. information that is brought to the attention of a manager through either formal or informal means. This research captured information on the frequency of receipt of information about external topics received formally and informally. Information was obtained on the following originating sources: superiors, peers, subordinates, company information reporting systems, external consultants, external market research professionals, and external industry commentators. The working proposition tested was that generally information received passively via informal channels would be significantly higher than the level of information received passively via formal channels. Additional exploratory tests were done to identify specific differences in the frequency of receipt of information for each originating source according to whether received by formal or informal means.

These eight propositions ensure that all of the relationships identified in Figure 11: Theoretical framework: Influence on managerial scanning behaviour, will be tested. In Sections 6.2.1 through to 6.2.8, the part of the theoretical model being tested will be presented in a separate figure at the beginning of each section. This helps to highlight the key tests and findings as they are made.

Many of these eight propositions involved tests with respect to scanning modes. In the survey questionnaire the predominant scanning mode of each individual manager was sought through Q17 on the survey. This question asked each manager to review four statements and indicate which one best reflected their more usual mode of information search and gathering. Arguably this information gave a fair representation of an individual manager's predominant scanning mode. On the other hand, the basis for identifying a manager's predominant way of scanning was based on a single question only. Hence, some additional analysis was done to identify important components underlying scanning behaviour (refer to Section 6.2.5). These components were then used in subsequent tests to determine if there were any major associations with the set of independent variables identified in the theoretical framework as represented in Figure 11. In this way, the analysis in this research concerning scanning behaviour did not solely rely on the data gathered through Q17 concerning scanning modes.

5. Methodology

5.1 Philosophical Perspectives

There are many arguments that can be offered about the logic of various research strategies and approaches, but ultimately each approach has its strengths and weaknesses. A review of the literature concerning approaches to social science makes it clear that there are no single or simple answers to fundamental research questions such as: what is the nature of reality to be investigated? how can knowledge of this reality be obtained? and what kind of research questions can be asked? An important initial step to help answer these questions is to consider the philosophical position on which the research is to be based. Clarity on the underlying philosophical position will also assist to determine the appropriate research design and choice of research methods. A more detailed discussion on philosophical factors and contrasting philosophical positions is made below. This is helpful to appreciate where realism, the adopted philosophical position underlying this research effort, is located relative to other positions. A further explanation of realism is then offered. Finally, a summary statement justifying the choice of the major research method is made.

Philosophical factors

A central question when approaching the issue of research design is: how do philosophical factors affect the overall arrangements which enable satisfactory outcomes from research activity? Easterby-Smith et. al. (1991) offer at least three reasons why an understanding of philosophical issues is useful. First, it may help clarify research design including considering what kind of evidence is required and how it is to be gathered and interpreted. Second, knowledge of philosophy can help the researcher to recognise which designs will work and which will not. Third, this knowledge can help the researcher to identify or create designs that may be outside his or her own experience.

Philosophical factors are often expressed in terms of ontology and epistemology. A distilled definition of each of these terms, as offered by Easterby-Smith et. al (1991), is provided in Table 1 below. Also provided in the table are distilled definitions for two other important terms in research design, methodology and methods.

Table 1: Research design key terms.

Terms:	Definitions:
Ontology	Assumptions we make about the nature of reality.
Epistemology	A general set of assumptions about the best ways of inquiring into the nature of the world.
Methodology	A combination of techniques used to enquire into a specific situation.
Methods	Individual techniques for data collection, analysis, etc.

* Source: Easterby-Smith. M., Thorpe, R., & Lowe, A. (1991).

Contrasting philosophical positions

A common starting point when reflecting on philosophical positions is to consider the two contrasting traditions of positivism and social constructionism. In the tradition of positivism, the key idea is that the social world exists externally, and that its properties should be measured through objective methods, rather than being inferred subjectively through sensation, reflection, or intuition. A collection of viewpoints that have come to be associated with the positivist view are as follows:

1. Independence – the observer is to be independent from what is being observed;
2. Value-freedom – the choice of what to study can be determined by objective criteria rather than by human interests;
3. Causality – the aim of social science is to identify causal explanations and fundamental laws that explain regularities in human social behaviour;
4. Hypotheses development – science proceeds through developing hypotheses of fundamental laws and then determining what kinds of observations will demonstrate their truth or falsity;
5. Operationalisation – concepts should be operationalised in a way that enables them to be measured quantitatively;
6. Reductionism – problems are better understood if they are reduced into the simplest possible elements;
7. Generalisation – to generalise about regularities in human and social behaviour it is necessary to select samples of sufficient size, from which inferences may be drawn about the wider population; and
8. Cross-sectional analysis – regularities can most easily be identified by making comparisons of variations across samples.

The contrasting philosophical perspective, social constructionism, adopts the view that “reality” is not objective and exterior, but is socially constructed and given meaning by people. This perspective focuses on the ways that people make sense of the world especially through sharing their experiences with others via the medium of language (Berger and Luckman, 1966; Watzlawick, 1984; Shotter, 1993; Winch, 1958). “Social constructionism” is one of a group of approaches referred to as interpretative methods (Habermas, 1970; Burrell & Morgan, 1979). The essence of social constructionism is that “reality” is determined by people rather than by objective and external factors. This implies that the task of social scientists should be to appreciate the different constructions and meanings that people place upon their experience. Adopting this approach involves focusing on what people are thinking and feeling and the means by which they communicate with one another. Therefore, the principle aim is to understand and explain why people have different experiences rather than search for external causes or fundamental laws to explain their behaviour. This aim reflects a view that human action arises from the sense that people make of different situations, rather than as a direct response to external stimuli.

Although it is possible to draw up a list of assumptions and methodological implications associated with each of the above positions of positivism and social constructionism, it is unusual to find any one philosopher or researcher who subscribes to all aspects of one particular view. A closer examination of different philosophical perspectives often reveals disagreements not just between different schools, but also among philosophers within the same school.

Ontology is often the starting point for variances in the views of philosophers and social scientists. In the natural sciences (as opposed to the social sciences) much debate has occurred between realism and relativism. Realism comes in several varieties. There is traditional realism that starts with the position that the world is concrete and external and that science can only progress through observations that have a direct correspondence to the phenomenon being investigated. A modified version of this view points out the differences between the laws of physics and nature, and the theories that scientists have about these laws. This position assumes that “the ultimate objects of scientific enquiry exist and act (for the most part) quite independently of scientists and their activity” (Bhaskar, 1989: 12). Therefore, internal realists concentrate more on the processes of observation (i.e. epistemology) and point out that it is only possible to gather indirect evidence of what is going on in fundamental physical processes (Putnam, 1987).

Internal realists do accept that scientific laws once discovered are absolute and independent of further observations. This is in contrast to the relativist position which suggests that scientific laws may not be so immutable; that the acceptance of a particular theory may be highly influenced by the politics of business, careers, and commerce (Latour & Woolgar, 1979; Knorr-Cetina, 1983).

In Easterby-Smith et. al. (1991), an effort is made to map out ontological and epistemological positions in both science and social science. The mapped out positions are presented in Table 2 below. At the top of the table there are listed three major ontological positions: representationalism, relativism, and nominalism. The first two positions roughly correspond to the internal realist and relativist viewpoints of science. The third position, nominalism, holds that it is the labels and names that we attach to experiences and events which are crucial. In the table itself, some of the cells have been left blank as they represent distinctions which are not generally seen as significant.

Table 2: Ontologies and epistemologies in social science.

Ontology of science:	Traditional Realism	Internal Realism	Relativism	
Ontology of social science:		Representationalism	Relativism	Nominalism
Truth:	is established by correspondence between observations and phenomena.	is determined through verification of predictions.	requires consensus between different viewpoints.	depends on who establishes it.
Facts:	are concrete.	are concrete, but cannot be accessed directly.	depend on viewpoint of observer.	are all human creations.
Epistemology of science.	Positivism		Relativism	
Epistemology of social science.		Positivism	Relativism	Social constructionism

Source: Easterby-Smith et. al (1991).

Philosophical assumptions adopted in this research

In this research, the basic ontological assumption adopted was that there are fundamental differences between natural and social phenomena. This basic assumption is consistent with an interpretative position. A further assumption was that the objects of scientific enquiry, social phenomena, are considered to exist and act independently of scientists and their activities. In terms of a basic epistemological assumption, it was held that the external social world and its properties should be measured through objective methods, rather than being inferred subjectively through sensation, reflection, or intuition. With reference to Table 2, Ontologies and epistemologies in social science, the philosophical position in this research is most akin to the column labelled “Internal Realism” and “Representationalism”. This combination of assumptions (i.e. an interpretative ontology and a positivistic epistemology) is consistent with the overall philosophical position labelled realism. A more detailed discussion of realism now follows.

Realism

The science of realism is concerned with what kinds of things there are and how these things behave. It is concerned with a reality that is claimed to exist and act even if it has not yet been observed. Further, it claims that theories are either true or false and that science aims at the truth about how the world behaves.

As outlined in Blaikie (1993), realism can be explored as a contemporary response to the key question, “Can the methods of the natural sciences be used in the social sciences?” Blaikie (1993) argues that the answer to this question with respect to realism is “yes and no”. The “yes” response occurs as realism argues for principles of enquiry which are claimed to be common to both areas of science. The “no” response is in recognition of the qualitative differences in subject matters between the natural and social sciences which adopts aspects of interpretivism.

While realism shares interpretivism’s view on the nature of social reality, it also shares positivism’s desire for producing causal explanations. Therefore, realism may be thought of as ultimately a search for generative mechanisms whereby such mechanisms are independent of the events which they generate. A further assumption is that events can occur independently of mechanisms being experienced. Hence, Bhaskar (1975) proposed that experience, events, and mechanisms are separate and constitute three overlapping domains of reality: the empirical, the actual, and the real. The empirical domain consists of events which can be observed; the actual domain consists of events whether or not they are observed; and the real domain consists of the structures and mechanisms which produce these events (Bhaskar, 1986).

Realist epistemology is based on the building of models of mechanisms such that if they existed and acted in the postulated way, they would account for the phenomenon being explained. In other words, these models comprise hypothetical descriptions which may reveal underlying mechanisms.

The strand of realism adopted in this research is akin to that articulated by Bhaskar (1975). He stressed that the methods used to research the natural sciences would differ from those used to research social sciences because of the differences in their subject matter: “The human sciences can be sciences in exactly the same sense, though not in exactly the same way, as the natural ones” (Bhaskar, 1979: 203).

A recent variant of the realist position is the idea of “critical realism” which starts with the realist ontology of Bhaskar (1975), and then incorporates an interpretative thread (Sayer, 2000). Critical realism recognises social conditions as having real consequences whether or not they are observed and labelled by social scientists, but also recognises that concepts are human constructions. The ontology of critical realism is that reality is “real”, but only imperfectly and probabilistically apprehensible and so triangulation from many sources is required to try to know it. This variant of realism was not adopted in this research. Instead, as above, the strand of realism adopted is closer to the perspective described by Bhaskar (1975) which adopts a positivist epistemology implying a very different research approach and selection of research methods than implied by critical realism.

Realist research strategy

A research strategy outlines how can “what”, “why”, and “how” questions be answered, and where does the research process begin. The realist philosophy implies a particular position on these issues which is outlined below.

The starting point of research for realism differs from other major research approaches and strategies. Other popular research strategies begin with inductivism which produces generalisations of relationships out of observations of specific events, or the polar opposite, deductivism, which begins explicitly with theoretical propositions which form an argument. Realism has rejected both of these starting points for research as unsatisfactory. It rejects inductivism because it is essentially descriptive and does not serve to explain much of anything. It rejects deductivism on the basis that it is a myth that the ideal form of knowledge is deductive. Realism starts with observed regularities and proposes models of structures and mechanisms to explain them. A combination of reason and imagination is required to “invent” the model, and then research has to be undertaken to try to establish its existence (Outhwaite, 1987).

The realist research strategy begins research in the domain of the actual with observed connections between phenomena (e.g. correlations between variables). The task of the research is to explain why such connections or relationships occur. The second step is to postulate the existence of “real” structures and mechanisms which, if they existed, would explain the relationship. The third step is to attempt to demonstrate the existence and operation of these structures and mechanisms either by experimental activity to isolate or observe them, or by eliminating alternative explanations.

Research design and methods

As discussed above, the acceptance of a particular epistemology usually leads the researcher to make choices in research design and methods that are characteristic of that position. Six choices impacting on research design and methods that are regarded as particularly significant are summarised by Easterby-Smith et. al (1991). These are listed in Table 3 below. Many of the choices to be made are aligned quite closely to different philosophical positions, and an awareness of this is helpful to ensure that different elements of research design are consistent with one another.

Table 3: Key choices of research design.

Researcher is independent	vs	Researcher is involved
Large samples	vs	Small numbers
Testing theories	vs	Generating theories
Experimental design	vs	Fieldwork methods
Universal theory	vs	Local knowledge
Verification	vs	Falsification

Many of the choices of research design and methods were closely aligned with the positivist epistemology associated with “internal realism”. This helped to ensure that different elements of research design were consistent with one another. In short, the choices made in this research were: the researcher maintained a distance from the material being researched (this applies to the survey component of the research); a large sample was obtained across a number of managers and organisations; this research focused on theory testing of various relationships between individual and organisational variables and scanning behaviour; fieldwork was undertaken to study

managers in real organisations using quantitative techniques; an attempt was made to generate knowledge that had universal validity versus only local applicability; and evidence was sought that falsified some prior notions of significant relationships between various independent variables and scanning behaviour.

Prior to summarising and justifying the choice of the major research method adopted, it should be noted that there were two different types of method adopted in this research. The first research method, in depth interviewing, was conducted in Phase 1. The results of Phase 1 informed the design of the survey questionnaire which was the primary research method used in Phase 2. The above commentary has focused on demonstrating that the survey method used in Phase 2 is consistent with the realist position adopted. This focus reflects that the survey method was the *main* type of method adopted. For further information on the in depth interviewing method used in Phase 1 please refer to Section 5.2, Methods.

Summary statement of choice of major research method

When considering which research methods to use it was helpful to reflect on the realist philosophical position adopted. A particular philosophical position implies that certain methods will be more effective than others. The realist position is considered a “special case” as it has a mixed ontology and epistemology; it has an interpretivist ontology and a positivistic epistemology. Of particular relevance to the selection of research methods is the underlying epistemological assumption (as opposed to the ontological assumption). This is because the acceptance of a particular epistemology usually leads the researcher to adopt methods that are characteristic of that epistemology. As outlined in Table 2, the realist position adopted in this research is associated with a positivistic epistemology, implying that positivistic research methods would be appropriate in this study. Therefore, the use of a survey questionnaire to gather the bulk of the data for this research is considered a valid method consistent with the adopted philosophical position.

As previously discussed, there are a variety of realist positions. The position adopted in this research is most closely associated with the realist position as outlined by Bhaskar (1979) (as opposed to the strand of realism espoused by Harré (1986)) and the internal realist position identified in Table 2 as presented by Easterby-Smith et. al (1991). An important distinction to make is that the realist position adopted in this research differs from critical realism. In critical realism, the ontology supposes that reality is “real”, but only imperfectly and probabilistically apprehensible and so triangulation from many sources is required to get to know it. Critical realism’s epistemological assumption is that findings are probably true, and its methodology is likely to include case studies and convergent interviewing. It has been proposed that critical realism is an appropriate paradigm for marketing research that involves case study research (Perry et. al., 1997).

Case study research was not adopted in this research for two major reasons. First, as above, the use of this method was philosophically inconsistent with the form of realism adopted in this research which has a positivistic epistemology. Second, this research was focused on theory testing and not on theory construction. The theory tested was

whether various variables identified in prior scanning studies actually impacted on scanning behaviour. If the nature of the research had been on theory construction, then more in-depth qualitative methods such as case studies would have been appropriate. Generally, it is recognised that case studies are good in the early stages of theory construction rather than when theories are being tested for generalisability to a target population.

In terms of research design, the potential for triangulation was considered. Of the three social science paradigms outlined in Table 2 – i.e. representationalism, relativism, and nominalism – relativism is most closely associated with the use of triangulation. This stems from its notion of truth as consensus between difference viewpoints with facts being dependent on the viewpoint of the observer. The realist position does not necessarily imply the need for triangulation. Instead, a realist view requires that the object of scientific enquiry is capable of being measured. In this study, the survey questionnaire served to gather data points on various aspects of a manager's organisation, experience, and scanning behaviour.

In this discussion to justify the major method adopted (i.e. survey questionnaire), it should also be noted that realism does not insist on a method, but encourages developing methods appropriate to the particular subject matter of the social sciences based on realist principles. Researchers will often use methods that are consistent with the philosophical position adopted. However, at other times, researchers will use a different set of methods in practice. This may occur because researchers don't agree with all of the assumptions within one philosophical position or other pragmatic factors come into play. Other factors may include tailoring the research methods to bring them into line with the specific purpose of the research; opportunistically using available data; and adopting methods that allow for research to be progressed with the budget and time constraints of the researcher. In this research, these pragmatic factors were not significant. Instead, the research design was consistent with the adopted philosophical position and the major research method was suited to the purpose of fundamentally testing theory and generating results that would be generalisable across the target population of practising managers.

5.2 Methods

As this research was interested in understanding individual scanning behaviour, it required understanding the perspective of the individual manager. Hence, the unit of analysis was the individual manager and in particular the individual manager within the top tier of management. Top tier managers were defined to be those managers predominantly in the top three levels within the organisational hierarchy. As discussed in Section 4.2, Research Assumptions, it was assumed that top tier managers were those most likely to significantly influence critical decision making and strategic formulation processes and would be able to exercise some discretion regarding how, where, and when to scan.

This research was concerned with updating the understanding of management researchers of the phenomenon of managerial scanning behaviour. As such, this research focused on obtaining data through direct interviewing of managers in their job settings as was done in the Phase 1 pilot study, or through answers to questions concerning manager's everyday work patterns and behaviour in their job settings as was done in Phase 2 through the broad based survey. This approach was adopted on the basis that it was effective to capture data suited to understanding actual managerial scanning behaviour as manifested in a business setting compared to alternative approaches such as conducting a laboratory study or a simulation study.

A further methodological choice arose as to whether to conduct a single industry or multiple industry study. Three major methods exist to control for potential industry effects – single industry samples, multiple industry control variables, and stratified samples by industry. Single industry studies are a relatively straightforward approach to control for industry effects (Dess, 1987; Fredrickson, 1984; Fredrickson & Mitchell, 1984). However, the extent of industry heterogeneity and the possibility of strategic groups represent complicating issues. Additionally, environmental factors do not affect each industry segment uniformly. Any generalisations must be accompanied by caveats describing an industry's idiosyncratic characteristics.

Multiple industry control variables may be applied to control for industry variance. Possible variables to apply include characteristics measures (e.g. concentration, growth, advertising intensity), measures of environmental dimensions indicative of industry characteristics/structure (e.g. munificence, dynamism, complexity), use of industry dummy variables (a coarse-grained measure), and adjustment for industry averages of critical variables under study and/or performance variables. An important issue with the use of this method concerns the selection of critical environmental dimensions which may be subject to bias. Researcher heuristics and recognition of trade-offs involving generalisability, accuracy, and simplicity (Weick, 1979) are required for effective selection.

Stratified samples by industry may match samples with the variables and relationships being examined (Harrigan, 1983). Examples of variables recommended for stratifying industries are extent of product differentiation, and size of exit barriers. Harrigan (1983) argues that a hybrid methodology – merging fine grained (case studies) and coarse grained (large data base research) – is appropriate for the complex nature of strategic management research and is necessary to enhance validity and statistical inference. However, this approach requires a significant knowledge of industries' characteristics and their relationships with the variables under study.

Prior studies of scanning and environmental interpretation have mostly focused on a small number of industries or single industry. Aguilar (1967) focused heavily on the chemical manufacturing industry (33 companies), with a minimal effort to expand the industry sample by including a further 7 companies, each from different industries. Kefalas and Schoderbek (1973) focused on two industries – farm equipment and meatpacking. Hambrick (1982) sampled three industries – private liberal arts college, voluntary general hospitals, and life insurance firms; Thomas, Clark, and Gioia (1993) focused on a single industry, healthcare, to control for the impact of industry

characteristics of the perceptions of strategic issues. Other relevant examples of single industry studies include Gioia and Chittipeddi (1991) - a large public multi-campus university; Milliken (1990) - private, four-year, liberal arts colleges; Meyer (1982) - hospitals/healthcare; Isabella (1990) - a medium sized, urban, financial-services institution; and Scheid-Cook (1992) - community health centres/healthcare.

This research adopted a phased approach in which Phase 1, a pilot study, was conducted within a single industry, the consulting industry. A second phase of the study was then conducted across multiple industries. The first phase pilot study was instrumental in identifying and understanding the major elements of scanning behaviour (the “what, where, and how” of scanning behaviour) and also most importantly developing a set of exploratory propositions and specific research sub-topics on which to base the subsequent second phase research and analysis. The second phase of the study involved gathering data from managers across multiple industries. This was done in the form of a broad based survey research effort. By gathering significant feedback across multiple industries it was possible to conduct statistical analysis to specifically test for the effect of industry on a set of dependent variables (e.g. perceived scanning time per week, attention paid to various environmental sub sectors etc.). Information on the type of industry categorisation scheme used is commented on further below.

Phase 1: Pilot study in a single industry

The first phase pilot study was consistent with the nature of the research proposal which is exploratory and focused on gaining an in-depth understanding of the phenomenon of scanning behaviour. Undertaking an in-depth pilot study in the consulting industry also leveraged off the skill set and industry understanding of the researcher, consciously traded off generalisability for accuracy, and recognised that further considerations had to be given to stratifying the industry by strategic groups to avoid obvious misinterpretations of results. In addition, consultants were considered to be good candidates for this type of pilot study on the basis that their job role requires them to be particularly sensitive to environmental changes and therefore they may employ a wide range of scanning behaviour. Huff and Schwenk (1990) offer support for conducting studies in industries or environments in which the researcher is knowledgeable if complicated personal mental models are being explored - “it might be assumed that the more knowledgeable the audience with whom performance is discussed, the better the data on executive attributions. This is not just because the knowledgeable audience limits conscious bias, but because the knowledgeable audience understands the sets of concepts which the executive must use to convey the complicated explanations of private thinking about the organisation and its situation.” (Huff and Schwenk, 1990: 93).

In phase 1, a limited number of interviews (10) were conducted with senior management consultants. At the time of these exploratory interviews, all the consultants interviewed were UK employees of global professional services firms. The 10 senior managers were drawn from three consulting organisations. Within the pilot sample, there were representatives from the following speciality areas: business process improvement, economic and regulatory, business strategy, litigation support

services, financial analytical, IT strategy, and ecommerce. Each consultant had at least seven (7) years consulting experience. The average years of individual consulting experience for the research subject group was nine (9) years, and the range was seven (7) through to (13) years of experience. The average age of the research subjects was thirty two (32), and the range was twenty eight (28) years to thirty four (34) years. All of the consultants in the pilot study had only worked for consulting organisations that were either major global consultancies or niche multi-national consultancies.

The interviewees were chosen opportunistically and were known to the researcher. Each interview lasted for approximately 1 to 1.5 hours. In half the cases, additional follow up questions of clarification were also made. The interviews proved effective to elicit insight to inform the subsequent design of the survey research questionnaire employed in Phase 2.

Further details on the research methodology adopted for the Phase 1 pilot study were as follows. The approach adopted was a semi-structured interview to elicit, at a minimum, the major features of scanning being breadth of information (i.e. description of the different types of information that get paid attention), sources used, and frequency of referencing chosen sources. A semi-structured interview was also considered effective to explore what managers' pay attention to versus using a pre-determined typology of external environmental sectors used in prior research that implies that managers' think in terms of environmental sectors and industry specific factors when they scan.

Similar to the technique used by Waller, Huber, & Glick (1995), some initial information was sought by a semi-structured questionnaire that asked managers to reflect upon an important environmental change, and then inquired as to how they learnt about that change, and hence determined the mode of scanning they adopted. An example of the type and structure of these questions is as follows:

- What important changes in the environment have occurred in the last six months?,
- Briefly describe these changes,
- How did you come to learn of these changes?, and
- Which source of information did you most seek/rely on and why?

The resulting data set was then coded according to the sectors of the environment that senior managers pay attention to and the modes of scanning that they adopted.

A further alternative approach to conducting the semi-structured issues was used based on generic type questions as opposed to a retrospective events history approach. These semi-structured interviews included the following questions:

- How do you keep in touch with events and changes in the environment?
- What kinds of things/information to you pay attention to?
- What sources do you reference?, and
- How frequently do you reference these?

Further probing questions were then asked to more fully understand the key features of an individual's scanning behaviour, such as degree of purposefulness of scanning, structure/formality of scanning effort, credibility assignment to sources, solicited versus unsolicited receipt of information, variety of sources referenced, and frequency of scanning efforts.

Phase 2: Survey research across multiple industries

The major method through which data about scanning behaviour was captured for this research was through administering a survey questionnaire. Nine main steps were undertaken to construct the scanning behaviour questionnaire and to pilot test it. In short, these steps were: 1) create an initial list of the information needed to a) analyse the set of relationships of interest, and b) gain further insight into individual scanning behaviour; 2) review all relevant prior scanning questionnaires to a) identify scanning attributes previously tested and to review these for inclusion in this survey, and b) review the layout and question type of prior questionnaires as input into the design of this survey; 3) review the outcome of the pilot studies to ensure that identified aspects of scanning behaviour were included in this survey; 4) review relevant scanning behaviour literature to identify major aspects of scanning behaviour that were not identified through reviewing prior surveys or reviewing the outcome of the pilot study; 5) construct an initial draft scanning behaviour questionnaire; 6) test the draft questionnaire with members of the pilot study; 7) refine the draft questionnaire based on feedback from pilot study respondents; 8) review the refined questionnaire with Cranfield School of Management faculty; and 9) refine the survey based on faculty feedback. Further elaboration of these nine steps now follows.

The first step involved creating an initial list of all desired information to be captured via the survey questionnaire. Desired information was identified through considering the relationships to be tested and analysed in this research. The relationships of interest were previously outlined in Section 3, Theoretical Framework, and Figure 11, Theoretical framework: Influences on managerial scanning behaviour. The theoretical framework specifically identifies a set of associations to test between individual experiential variables and scanning components, and contextual variables and scanning components. Individual experiential variables comprised hierarchical level, functional roles, age, cross functional experience, and post graduate education in management. Contextual variables comprised company size, industry affiliation, and organisational strategy. Hence, information was needed with respect to each of these eight independent variables. A list of these independent variables and the survey questions developed to capture the relevant information is summarised in Table 4 below.

Table 4: Scanning survey: Individual experiential and contextual variables.

Independent variables:	Question input into survey:	Reference: question number in final survey:
Hierarchical level	How many organisational levels are you below the chief executive or managing director of the company?	Question 7.
Functional roles	Please click on which functional area you currently work in: Research & Development; Marketing; Sales; Customer Service; Production; Financial Accounting; Corporate Planning; General Management; Engineering; Human Resources; Information Technology; Other (please write in).	Question 2.
Age	Date of birth.	Question 1.
Cross functional experience	How long have you been within your current functional area? If you've worked in other functions, what were they?	Question 4.
Post graduate education in management	N/A.	This information was sourced from School of Management database.
Company size	What is the approximate size of the company in which you work in terms of revenue? <£1m; £1-10m; £11-100m; £101-500m; >£1b; Don't know. What is the approximate size of the current company to which you belong in terms of number of full time employees?	Question 5 and 6.
Industry affiliation	What industry does your company mainly operate within?	Question 3.
Organisational strategy (strategy process).	Strategy Process. Please indicate to what extent the following statements reflect your perception of how strategic decisions are made in your organisation: The strategy we follow is directed by a vision of the future associated with the chief executive (or another senior figure); We have well defined planning	Question 13.

	procedures to search for solutions to strategic problems; Our strategy develops through a process of ongoing adjustment; Our chief executive tends to impose strategic decisions rather than consulting the top management team; We have precise procedures for achieving strategic objectives; and We tend to develop strategy by experimenting and trying new approaches in the market place.	
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The Theoretical Framework outlined in Section 3, also identified the dependent variables of interest under the heading of Scanning Components. Under this heading, three components of scanning are identified as follows: 1) How managers gather external business information; 2) What external business information managers pay attention to; and 3) Where managers source external business information from. For each of these three components, survey questions were developed to capture the related information.

Question 11 and question 12 of the survey were titled Scanning Behaviour. These two questions were designed to gather information on the first sub-component of scanning i.e. how managers gather external business information. Information on component two (i.e. what external information managers pay attention to) was gathered through survey question 8. This question asked respondents to rate the frequency with which they paid attention to 15 different types of environmental information. Question 14 of the survey addressed the third component i.e. where managers source external business information from. This question asked respondents to rate the frequency of use of four major sources: personal networks of individuals outside your company; internet sources including search engines, company websites, email information subscription services; traditional mediums such as television, radio, newspaper, business magazines etc.; and company personnel such as superiors, peers, and subordinates. The initial draft of each of these survey questions (i.e. Q11, 12, 8, & 14) was primarily based on the researcher’s knowledge of the subject from literature reviews. The draft survey questions were subsequently refined primarily through reference to prior surveys and pilot study outcomes as outlined in the steps below.

Step two was to review all relevant prior scanning questionnaires. Two questionnaires that were particularly relevant to this research were those developed by Hambrick (1982) and Kefalas & Schoderbek (1973). Hambrick (1982) developed and administered a questionnaire as part of his study into the relationship between environmental scanning and organisational strategy. In part 1 of Hambrick’s questionnaire were listed 20 types of external events particular to the industry under study. Respondents were asked to rate the approximate frequency with which each type of information about these 20 events came to mind. Each of these events was pre-coded into an environmental sector typology. Part 2 of Hambrick’s questionnaire asked respondents to state the number of hours spent learning about these various trends.

Hambrick's questionnaire was limited in terms of the type and depth of information it captured regarding scanning behaviour; too limited to meet all of the information requirements of this research. However, aspects of its design were suitable for incorporation into this survey. Hambrick's (1982) survey influenced the design of this research in two major ways. First, it confirmed that the type of question used to gather information on environmental sectors (i.e. a rating scale question to capture frequency of attention paid to different categories of environmental events and information) was appropriate. Second, it prompted the inclusion of an additional two questions concerning time spent scanning. Q9 was drafted as follows: "How do you divide your time finding out about topics of potential significance? Please allocate 100% across the following categories. You may find it useful to glance at all the categories first. Competition (%), Customers (%), Technical Information related to your products/services (%), Suppliers (%), Economic environment and regulatory (%), Broader social/cultural issues (%)." The second question concerning time, Q10, was drafted as follows: "On average, how many hours per week do you spend finding out about all of the topics outlined in Q9?"

The scanning questionnaire used by Kefalas & Schoderbek (1973) also influenced the design used in this research. Kefalas & Schoderbek's (1973) questionnaire captured key information on scanning behaviour (e.g. sub-sectors attended to, time etc.) and some key job characteristics (hierarchical level, functional specialty, etc.). A check was done to ensure that these base measures, especially concerning environmental sub-sectors, were also included (albeit sometimes in a different form) in the survey used in this research.

Step 3 involved reviewing the outcome of the pilot studies to ensure that identified aspects of scanning behaviour were included in this survey. A prime purpose of the pilot studies was to more fully understand the key features of an individual's scanning behaviour. Based on this understanding, a more comprehensive list of statements reflecting individual scanning behaviour was developed. Forty four such statements were developed and included in Q11 and Q12 of the survey. Examples of the statements concerning individual scanning behaviour that emerged through the pilot studies are as follows: "I often feel uneasy because I can't deal with the massive amounts of information I come across"; "I tend to limit the information I'm exposed to when I feel overwhelmed"; and "I will usually change the information mediums I use when I feel overwhelmed by the amount of information I come across".

Once step 3 was done, a further exercise was undertaken to identify the major aspects of scanning behaviour to include in Q11 and Q12, Scanning behaviour. Step 4 involved reviewing relevant scanning literature to specifically identify aspects of scanning behaviour that were not identified through reviewing prior scanning surveys or the outcome of the pilot studies. In particular, the 13 major research studies relevant to scanning and interpretation, summarised in Appendix I, were reviewed. Particular attention was paid to the work of Aguilar (1967) as this study was one of the more in-depth scanning studies. In Aguilar's (1967) study it was proposed that managers adopt a predominant mode of scanning i.e. undirected viewing, conditioned viewing, informal search, or formal search. As a result of reviewing the description of these modes, a number of related statements were derived and subsequently included into

Q11 and Q12 concerning scanning behaviour. Examples of such statements are as follows: “I usually seek out clearly identified types of information”; “I usually have a formal or structured plan or process to gather the information I consider I need”; and “I would describe my approach to scanning for key information about the environment as very systematic”. Reviewing Aguilar’s (1967) study also highlighted an aspect of scanning that had not yet been captured in the survey which was “passive receipt of information” or unsolicited information. Hence, an additional set of questions were developed to be incorporated into the survey. These additional research questions, Q15 and Q16 of the survey, captured information that was passively received by individual managers through formal reporting processes or received informally (initiated by superiors, peers, subordinates, external consultants, external market research professionals, or external industry commentators). Finally, step 4 also resulted in adding a question to explicitly test the frequency of predominant adoption of Aguilar’s (1967) proposed scanning modes; refer to Q17 of the survey. This question was deemed important as an opportunity to test the validity of the scanning modes as a basis for distinguishing between scanning behaviours.

The fifth step was to construct an initial draft of the scanning survey. The information topics mentioned above – i.e. age, functional role, industry affiliation, cross-functional experience, company size, hierarchical level, post graduate education in business and management, scanning behaviour, environmental sector attention, sources of information, scanning time, strategy process, and passive receipt of information – were converted into appropriate question formats. Where needed, instructions on how to complete a particular survey question were drafted. For example, instructions on how to complete a rating scale question, Q8, to capture frequency of attention paid to various environmental types of information were as follows: “Below you will find topics of information about the external environment. Please indicate how frequently each type of information comes to your attention using the one (1) to seven (7) scale below. A score of 1 means that this type of information comes to your attention very infrequently, for example, once every six months or less. A score of 4 may indicate a frequency of once every couple of months or so. A score of 7 indicates that this information comes to your attention very frequently, for example, once every day or more.” Some additional questions were added to help clarify the respondent’s personal details. These included asking for name, title, employer company name, and the name of the division within which they currently work. Finally, an open ended question was added at the end of the survey to capture any additional thoughts a respondent may wish to share regarding scanning behaviour.

Step 6 was a critical step in the survey development process. In this step the draft survey questionnaire was tested with 5 participants from the initial pilot study and 2 further participants who were practising managers and opportunistically chosen. Each participant was given a paper copy version of the survey questionnaire and asked to independently complete it. No further instructions were offered as it was desirable to replicate conditions in which an individual respondent had no additional support or means to ask clarifying questions while completing the survey. Feedback was then sought in terms of clarity of survey instructions and layout, overall ease of survey completion, clarity of meaning of survey questions, time taken to complete the survey,

and any other impressions to correct the existing survey or enhance its effectiveness to capture the respondent's scanning behaviour.

Step 7 involved refining the draft survey questionnaire based on this feedback from the respondents in the survey trial. Some refinements made included adding an "other" category into Question 2 concerning functional area; adding a question to learn how long a respondent had worked within their current company; changing some of the wording of the scanning behaviour statements to make them easier to understand; and elaborating on the meaning of a "scanning mode" in the introductory paragraph ahead of Question 17. The respondents in this trial of the survey also reported that the test took them approximately 30 – 35 minutes to complete.

The next step, Step 8, was to review the questionnaire with members of Cranfield School of Management faculty. This check was helpful to gain expert input from a research perspective. Some issues that arose included whether the survey was too long (at an average completion time exceeding 30 minutes) resulting in an unnecessarily high respondent drop out rate; whether the strategy process questions could be streamlined for the purposes of this research; and whether certain similarly natured statements concerning scanning behaviour could be merged or deleted.

Step 9 was to make final adjustments to the survey to reflect feedback from faculty. Through reducing the number of statements in Q11 and Q12 concerning scanning behaviour, and through streamlining the strategy process questions, the survey was shortened and the estimated average respondent time reduced to approximately 25 minutes. The survey captured information on individual scanning behaviour characteristics, personal experience and job characteristics, and organizational characteristics. An overview of the sub-topics within this survey and the information gathered within these sub-topics is provided in Table 5 below.

Table 5: Scanning behaviour survey: sub-topics and information requested.

No.	Sub-topics:	Information requested:
1	Personal details	* name, title, company, company division, date of birth
2	Functional area	* functional area in which respondent currently works
3	Industry	* industry in which company mainly operates
4	Professional details	* length of time working within company and current functional area and list of other functions worked in
5	Size of company	* size of company in terms of revenue and number of full time employees
6	Hierarchy	* number of organizations levels positioned below CEO
7	Scanning frequency	* frequency of attention paid to fifteen different environmental types of information
8	Time	* percentage of time spent scanning split over six major environmental information sectors and

		estimated number of hours spent scanning per week
9	Scanning behaviour	* rated applicability of forty four statements of scanning behaviour
10	Strategy process	* rated perceived adoption of three forms of strategy process
11	Sources	* rated frequency of use of four different types of sources
12	Passive receipt of information – both formally and informally received	* rated frequency of receipt of information from seven different sources – received both formally and informally
13	Scanning modes	* selected predominant scanning mode from four scanning mode options

The survey itself was hosted online. An internet based web-site was created to enable respondents to enter their answers to the scanning survey questions online. To view the survey instrument refer to Appendix M, Scanning behaviour survey. Invitations to participate in the survey were sent via email. At the end of the email invitation a hyper-link was provided (i.e. a link to the survey web-site). Respondents simply clicked on the hyper-link and they were taken to the survey web-site. The survey management software automatically recorded a list of survey invitees, survey respondents, and non-respondents. In this research effort, a total of 1,761 survey invitations were sent out. The initial number of responses received was 411. Of these responses 394 were usable, equating to an effective response rate of 22.4%.

Throughout the survey administration period minor changes in methodology were associated with improved response rates. Improved response rates seemed to occur through addressing the invitee by their first name in the email invitation itself; identifying both the research institution (i.e. Cranfield School of Management) and the nature of the survey (i.e. Scanning behaviour survey) in the email subject title; sending the email during mid week between mid morning and mid afternoon; and including an offer to provide summary details of the research findings to all interested respondents.

The survey was targeted at top tier managers. A question in the survey identified the organisational level of the managers. The organisational level was expressed at a level below the CEO position. In this research, manager respondents ranged from 0 to 7 levels below CEO. The vast majority of respondents (82.2%) were within 4 levels below CEO level. For information on the number of manager respondents at each organisational level refer to the below Table 6.

Table 6: Managers' self-reported organisational levels below CEO.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	33	8.4	8.6	8.6
	1	81	20.6	21.1	29.8
	2	77	19.5	20.1	49.9
	3	65	16.5	17.0	66.8
	4	59	15.0	15.4	82.2
	5	41	10.4	10.7	93.0
	6	11	2.8	2.9	95.8
	7	7	1.8	1.8	97.7
	8	3	.8	.8	98.4
	9	1	.3	.3	98.7
	10	3	.8	.8	99.5
	11	1	.3	.3	99.7
	15	1	.3	.3	100.0
	Total	383	97.2	100.0	
Missing	999	11	2.8		
Total		394	100.0		

Managers also indicated which functional area they currently worked in. The total number of functional areas reported was 24, being research & development; marketing; sales; customer service; production; financial accounting; corporate planning; general management; engineering; human resources; information technology; consulting; risk management; logistics & distribution; treasury; investment management; ecommerce; health & safety; media; legal; multiple finance, accounting, & internal support; multiple sales, marketing, & business development; multiple production, operations, & product development; and other. Of these functional areas there were 6 major functional areas that were individually greater than 5% of the total valid percentage being: marketing; sales; corporate planning; general management; consulting; and multiple sales, marketing, business development. For information on the number of manager respondents at each functional area refer to the below Table 7.

Table 7: Managers' functional area affiliation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	research & development	11	2.8	2.8	2.8
	marketing	36	9.1	9.2	12.0
	sales	24	6.1	6.1	18.2
	customer service	6	1.5	1.5	19.7
	production	9	2.3	2.3	22.0
	financial accounting	15	3.8	3.8	25.8
	corporate planning	21	5.3	5.4	31.2
	general management	124	31.5	31.7	62.9
	engineering	5	1.3	1.3	64.2
	human resources	7	1.8	1.8	66.0
	information technology	19	4.8	4.9	70.8
	consulting	32	8.1	8.2	79.0
	risk management	3	.8	.8	79.8
	logistics & distribution	2	.5	.5	80.3
	treasury	6	1.5	1.5	81.8
	investment management	13	3.3	3.3	85.2
	ecommerce	1	.3	.3	85.4
	health & safety	1	.3	.3	85.7
	media	1	.3	.3	85.9
	legal	2	.5	.5	86.4
	multiple finance, accounting, internal support	13	3.3	3.3	89.8
	multiple sales, marketing, business development	37	9.4	9.5	99.2
	multiple production, operations, product development	1	.3	.3	99.5
	other	2	.5	.5	100.0
	Total	391	99.2	100.0	
Missing	999	3	.8		
Total		394	100.0		

Information on which industry a manager's firm mainly operated in was also captured. This information was categorised using standardised industry categories based on SIC Code '92 classification. Forty (40) separate industry categories were applicable to categorise the replies received. The industry categories used are listed in Appendix J, Industry classification of survey responses.

Of these forty (40) industry classifications there were 5 major categories that were individually greater than 5% of the total valid percentage which were: post and telecommunications; monetary intermediation; insurance and pension funding; business and consulting management activities; and computer and related activities. For information on the number of respondents classified into each industry classification refer to the Appendix J, Industry classification of survey responses.

For the purposes of analyses industry classifications were classified into four high level categories. This higher level of categorisation was also drawn from the standardised industry categories based on SIC Code '92 classification. The four overarching industry categories used were: Manufacturing (SIC '92 Code D); Transport, Storage, and Communication (SIC '92 Code I); Financial Intermediation (SIC '92 Code J); and Real estate, renting, & business activities (SIC '92 Code K). For information on the number of responses classified into these four higher level categories refer to Table 8 below in which 1 = Manufacturing; 2 = Transport, storage, and communication; 3 = Financial intermediation; and 4 = Real estate, renting, & business activities.

Table 8: Four major industry classifications.

Industries: 1 = Manufacturing, 2 = Telecommunications, 3 = Financial intermediation, 4 = Other business.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	82	20.8	25.1	25.1
	2.00	32	8.1	9.8	34.9
	3.00	89	22.6	27.2	62.1
	4.00	124	31.5	37.9	100.0
	Total	327	83.0	100.0	
Missing	System	67	17.0		
Total		394	100.0		

Respondents were represented across a wide range of sized companies ranging in annual revenues of less than £1 million through to greater than £1 billion. The largest representation was from companies with revenues greater than £1 billion at 41.2%. The next significant level of representation came respectively from companies with revenues £11 million to £100 million; £1 million to £10 million; and £101 million to £500 million. For detailed information on the representation of responses by size of company revenue refer to Table 9, Size of company frequency statistics.

Table 9: Size of company frequency statistics.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< £1mill	30	7.6	7.9	7.9
	£1 mill to £10 mill	58	14.7	15.3	23.2
	£11mill to £100 mill	59	15.0	15.6	38.8
	£101 mill to £500 mill	48	12.2	12.7	51.5
	£501 mill to £1 bill	28	7.1	7.4	58.8
	> £1 bill	156	39.6	41.2	100.0
	Total	379	96.2	100.0	
Missing	999	15	3.8		
Total		394	100.0		

Other statistics on the attributes of the survey responses (e.g. work time spent with company, level of cross functional experience etc.) are provided and commented on in the body of the results, Section 6.2 Results.

5.3 Research Design Issues

A number of key research design issues were identified through considering the concepts and ideals of research reliability and validity. Research reliability, with respect to measurements, means that the measurements should be accurate and trustworthy. This implies that someone else using the same measurements would have obtained the same or similar results. In this context, reliability refers to the stability of the measures – the extent to which repeated measurement yields constant results over a reasonable time period. Reliability is essential for validity. If measures are not reliable then it is not possible to measure the desired object of research reliably.

An initial research design issue considered was sample bias. As in all surveys of a sample or sub-set of the target population, there is a risk of sample bias. A useful set of questions to consider when deciding upon a sample and assessing the risk of sample bias is offered by Sapsford (1999). These questions include: what is the target population?; how, ideally, do I get a representative sample of them?; what can I do to get a representative sample given resource limitations?; is this method likely to result in misrepresentation?; and alternatively, given that I have access to a given group of respondents, of what population can they be said to be representative?

In answer to the first of the above questions, the target population in this research was senior and experienced managers who would likely be able to exercise some discretion as to how they scan the business environment. The approach adopted to gain a representative sample of such managers was to utilise lists of practicing senior managers maintained by Cranfield School of Management. Obtaining, vetting, and formatting these lists was possible to do within the resource constraints of the project. These lists were considered appropriate as the individuals listed were sufficiently senior and experienced i.e. they meet the main criteria of the target population. Two main types of lists were used: a list of recent MBA graduates (from the years 2000 to 2003) and a list of managers who had recently attended executive education courses in connection with developing better business strategies and improving general managerial skills.

The next relevant question then posed is whether this method is likely to result in misrepresentation. Some degree of misrepresentation may result due to the connection between the sample of managers and Cranfield School of Management. If it is assumed that each business school has unique aspects in terms of how it develops and delivers its business and management education, then the skills and capabilities of each set of graduates may be differentiable to some extent. These differences could translate to differences in managerial behaviour in practice, including differences in scanning behaviour. The extent of differences in behaviour is difficult to estimate. The assumption made in this research is that scanning behaviour exhibited by managers who have participated in some educational courses at Cranfield School of Management is not significantly different from managers who have participated in equivalent level

business and management educational courses at other accredited educational institutions. It was also assumed that managers in senior positions will have generally undertaken some formal training primarily through attendance on short courses internal to the company or run externally.

A potential bias within the sample itself was recognised. This bias concerned expected differences in scanning behaviour between MBA graduates and Non-MBA managers. An assumption made was that an intensive educational process over an extended period of time, such as an MBA course, was more likely to impact on an individual's scanning behaviour than attendance at a one-off educational course or intermittent participation in executive education. The rationale underlying this assumption was that MBA graduates are more likely to be information orientated and attentive to the external business environment than Non-MBA managers. It was therefore important in this research that the sample comprised a significant number of managers that were MBA graduates and Non-MBA managers. The final sample in this research comprised 100 Non-MBA managers and 294 MBA graduates; a statistically significantly large sample in each category.

A further possible cause of misrepresentation or bias in the sample, may result from the use of email as the medium through which respondents were contacted, and the internet as the medium through which feedback was obtained. On the list of managers obtained through the Cranfield School of Management, almost all managers (approximately 98%) were contactable by email. It was thought that missing email addresses were more likely due to administrative errors than the non-existence of a contact email address. This suggested that using email addresses as the means to contact senior and experienced managers was acceptable as it would not exclude a significant percentage of the target population. More generally, it is proposed that email is a well established technology utilised by almost all managers within the target population. Hence, the use of email as a means to communicate with the targeted sample of managers and to invite them to participate in the survey would not seem to significantly bias the sample. Indeed, the advantage of using email is that it is possible to quickly and efficiently communicate with specifically targeted managers.

A further potential bias in the sample may have resulted due to the survey being hosted on the internet. Each invitation email contained a hypertext link. If the respondent clicked on this link, then he or she was taken to a web-site on which the survey was presented. The respondent would then provide their feedback online via keyboard and mouse control. It is possible that if managers were unfamiliar with the internet, they may perceive that completing an online survey would be difficult and therefore not proceed. However, it should also be pointed out that there is no degree of expertise required to answer an online survey; it is as simple as clicking on a link. If a manager has the ability to open an email, then he or she has the ability to complete an online survey. Hence, it was assumed that hosting the survey online was not a serious impediment to completing the survey for the targeted group of senior and experienced managers.

A further bias to consider is general non-response bias. Some managers in the initial invitee list may have had a bias to not co-operate with this research. This bias may be

philosophical (e.g. no obvious personal benefit through participation) or practical (e.g. no available time to commit). Whatever the reason, there is likely to be a sub-set of the initial invitees that have a non-response bias. Conversely, there will also be a sub-set of managers who are more inclined to respond than on average. These managers may have a stronger than average drive to express themselves or to engage in activities outside of their normal routines. This response bias effect is much stronger still with entirely volunteer samples, for example, samples achieved through advertisements and interviewing those who reply to it. In this research, the invitees were targeted and not subject to general advertising, hence reducing the positive response bias effect.

Summary comments with respect to sample bias which also reflect answers to the questions posed by Sapsford (1999) concerning sample bias are as follows. The target population for this research was senior and experienced managers. Ideally, a list of this target population would be obtained and a selection of managers would be randomly chosen for inclusion in this research. Unfortunately such a list does not exist and the practical difficulties of creating such as list coupled with the significant resources required are not justifiable in the context of this research effort. Therefore, in light of resource limitations, an alternative set of lists of senior and experienced managers (i.e. MBA graduates from 2000 to 2003, and managers who had recently attended executive education courses) were sourced through Cranfield School of Management. As acknowledged above, these lists may result in some misrepresentation of the population of senior and experienced managers compared to the actual targeted population. Potential biases specific to this research result from the connection of the respondents to Cranfield School of Management; differences between MBA and Non-MBA responses; use of the email to contact the sample; and use of the internet to capture survey feedback. The differences in MBA and Non-MBA responses were separately dealt with through obtaining a statistically significant sample of each in order to compare and contrast any differences in scanning behaviour. In terms of the other biases, it was assumed that these were not significant and did not invalidate the survey. Other general response and non-response biases which occur among sample respondents were also acknowledged. Upon final analysis, it was considered that the obtained sample of senior and experienced managers were sufficiently representative of the target population. This allowed for subsequent reliance on the validity and generalisability of the feedback from the sample managers concerning scanning behaviour.

Each completed survey captured 101 items of information which were inputted into a SPSS database. Of these, 99 items were measurement data used in subsequent statistical tests and analysis (the other 2 items were nominal personal identity data items only). Of these 99 measures, those that captured information on job position (e.g. function, tiers below CEO position etc.), organisational characteristics (e.g. size of company, industry membership etc.), and individual attributes (e.g. tenure, cross-functional experience etc.) were expected to be associated with high reliability. In other words, it is expected that for these items, administering the survey again or having another researcher administer the survey would result in the measured outcome being the same or similar to those recorded in this research.

The other types of questions in the survey concerned frequency of attention paid to various environmental sectors; time allocated across major business environment topics; average time spent scanning per week; scanning behavioural attributes; strategy process; information sources used; passive receipt of information; and scanning modes. The answers to these questions were more subjective in nature. It is unlikely that the answers to these questions would be as consistently reported, or reliable, as the other attributes discussed above. However, there is no obvious reason to suppose that if the same instrument were administered by a different researcher that the results would not be similar. As the survey questionnaire was just recently developed and administered it is not possible to report on the medium or long term stability of the measures. An exercise to re-administer the survey to a sub-set of the respondents and analyse the consistency of responses would be possible to do in the future. Assuming that the critical scanning behaviour of the individual manager respondent had not changed, there would be a basis on which to more fully report on the long term reliability of the scanning survey research measures.

A further consideration was research validity. To ask about the extent to which a study is valid is to ask about the status of the evidence. The question to be answered is whether what is presented as evidence can carry the weight of the conclusions drawn from it. Three aspects of validity to consider are: 1) validity of measurement – the extent to which the data gathered constitutes accurate measures of what is supposed to be measured, 2) population validity – the extent to which the sample is an accurate representation of the population which it is supposed to represent, and 3) validity of design – the extent to which the comparisons being made are appropriate to establish the arguments which rest on them (Sapsford, 1999).

Attempts to achieve high validity of measurement equated to reviewing all other major scanning studies and understanding what measures had been used in the past to assess various aspects of scanning behaviour. The rationale used in prior studies as to why certain measures were reflective of what was supposed to be measured was reviewed and assessed for relevance to this research. For the most part, similar rationale and measures used in prior studies were adopted in this research (e.g. what paid attention to, frequency of attention, frequency of sources referenced etc.) This congruence with prior rationale and measures provided greater assurance in the validity of measures used. The two issues that emerged from considering validity of measurement worth further commentary are espoused theory versus theory in use, and perception in a natural complex setting.

An obvious concern was whether reported behaviour reflected actual behaviour. This issue is pervasive to research that involves eliciting perceptions, beliefs, or values from the research subject (Waller, Huber, and Glick, 1995). Many situational factors such as politics, appearance of rationality, instinctive responses, change in priorities, etc. may create a difference between espoused theories and theories in use. When researching aspects of interpretation, it should be expected that some imprecision will result that must be accommodated for in subsequent analysis. As Daft & Weick (1984) state, “An interpretation system is an awesomely complex human social activity that may not be amenable to precise measurement at this point in development” (Daft & Weick, 1984: 294). Regardless of research method chosen, there is likely to be some

difference between espoused theory versus theory in use due to the number and complexity of situation factors mentioned above. In other circumstances a triangulation of other data sources coupled with greater observation may assist to identify differences between reported behaviour and actual behaviour. However these research techniques are not so effective in measuring the subtle and intermittent activity of scanning as is commented on further below.

A further and closely related methodological issue was how to determine what senior managers' perceive in a complex natural setting. The same issue arose in Waller, Huber, & Glick's (1995) research titled "Functional background as a determinant of executive's selective perception". They concluded that there is no wholly satisfactory research protocol for identifying what people perceive, especially in a complex natural setting. And largely because the alternative methods had more serious shortcomings, Waller et. al. chose to use a field study employing questionnaires and a series of semi-structured interviews in order to construct retrospective event histories (cf. Glick, Huber, Miller, Doty, & Sutcliffe, 1993: 299-301).

Waller et. al. (1995) chose not to attempt to directly observe the sensing of changes because they judged that it would not be feasible to monitor the number of executive hours necessary to provide sufficient data for the analysis they desired. A further research methodology choice made by Waller et al. (1995) was not to use actions occurring after the sensing of change or other executive behaviours as indicators of perceived changes, because much that is perceived does not manifest behaviourally for some time, if ever. This latter reasoning disallowed, for them, the use of archives or second-hand reports as indicators of what executives perceived. Thus, Waller et al. (1995) concluded that there was no better procedure for learning what changes executives perceived than asking them what changes had occurred (see Snyder and Glueck (1980) for a similar set of arguments). In this research, a similar direct approach to gather research information was adopted through the direct questioning of respondents in the Pilot study and employing survey questionnaires to gather direct responses concerning individual perceptions related to the practice of scanning.

Population validity was considered both organisationally and geographically. The target population of this research were senior managers – i.e. those managers more likely to be cognizant of an organisation's strategy, play a role in strategy formulation, and exercise discretion regarding the what, how, and where of scanning. All responses processed in this research meet the basic profile of being occupied in a managerial type role. Further, the percentage of senior level managers was quite high. Those managers that reported seniority as being 4 levels or higher above CEO level represented 82.2% of all respondents. As for geographic validity, it is accepted that majority of responses to this survey are UK based managers. As such, limitations on the generalisability to all managers regardless of geography must be accepted. A later study to administer the survey research instrument in another distinguishable geographic area may serve to highlight differences in scanning behaviour due to country specific and cultural differences.

Finally, validity of research design was considered. This involved considering the extent to which the comparisons being made were appropriate to establish the arguments which rested on them. The majority of analysis done in this research involved categorising managers' responses and then analysing the categorisation results for any unusual or significant associations. The most extensive statistical analytical technique used in this research was the chi-square test. This test assisted to discern differences in data grouped by categories with a greater degree of validity than merely a visual inspection and commentary. Many of the prior major scanning studies had relied on commentary on tabulated results with only minimal application of additional statistical analytical techniques. Other statistical techniques used were ANOVAs, t-tests, principal components analysis, and multiple regression. For further information on the selection of statistical analytical tests used refer to Section 6.2, Proposition Results.

6. Results

6.1 Pilot Studies

As discussed in Section 5, Methodology, a limited number of exploratory interviews were conducted with senior management consultants. The main purpose of the interviews was to elicit insight to inform the design of the survey research questionnaire. The pilot study respondents were opportunistically chosen from the consulting industry on the basis that this leveraged the skill set and industry understanding of the researcher. In addition, consultants were good candidates for the initial exploratory pilot study as they were considered to be particularly sensitized to environmental changes consistent with their role.

As expected, the subject of scanning behaviour was difficult to research because, amongst other reasons, scanning represents a basic behavioural aspect of a manager's activity and is not always done with conscious awareness (Hambrick, 1982), as evidenced by one research subject who stated:

"I can't articulate how I scan, or what is salient. A lot of stuff isn't salient, but I've never been that sort of person that I'll only go for the stuff that is directly related to my job .."

Specific insights into the environmental sector categorisation scheme used by respondents when scanning also arose from the pilot studies. Prior to the pilot studies it was not clear whether an analysis of the sources of information should use some prior environmental sector categorisation schemes or not. The specific environmental categorisation scheme considered was that used by Waller, Huber, & Glick (1995) who used 10 categories of 1) parent, division, or subsidiary, 2) regulatory, 3) customer/client, 4) competitor, 5) financial, 6) supplier, 7) economic, 8) labour market, 9) union, and 10) technology. However, when an attempt was made to map the "kinds of information and sources" that were identified in the first two interviews onto the Waller et. al. (1995) scheme, there were many instances where categorisation was not possible. This result was due to some overlap in terms of the category definitions, and suggested that aspects of the environmental categorization scheme were "artificial constructs" in the sense that they may not accurately reflect the framework that managers actually use when scanning. For example, four (4) of the ten (10) categories – parent, division, or subsidiary; customer/client; supplier; and union - were not used when categorising the research output. This suggested that a categorisation scheme that emerged from the pilot interview data may usefully inform the environmental categories to be incorporated into the final scanning survey instrument questionnaire.

An issue that unexpectedly arose in the pilot studies was that of information overload. Research subjects identified that this was a current and major issue for them. One research subject stated:

"All the other stuff, it does get to the point where I think, I can't. That meeting last Thursday, I literally, I just thought to myself, I can't, my brain cannot deal with another set of stuff because I've got this, and this, and this. It's just like, oh, overload... I really believe that some application that will help people avoid information overload or management information overload while allaying their fears that they are doing enough reading to keep current, to keep fresh and informed of all the people out there."

This led to asking questions such as: is information overload more an issue now than two years ago?, how does it manifest itself? what are the implications on how managers' scan?, and what strategies are in use to deal with this issue? It was clear that different research subjects were employing different sets of strategies to manage information overload, such as not delving into too much detail on a particular subject until it has been discerned multiple times. For example, a supporting quotation was as follows:

"Well I do what I can and try not to worry about the rest. And I use the three strikes and you're out kind of thing. If I hear about it, or read it quickly, on the third time I see reference to it, then I'll actually go back and take the time to read a bit more. Because that's the only way, it gives me confidence that it's not just today's little fad."

A further strategy to deal with information overload was to network with knowledgeable people as stated below:

"The other thing I do is I learn who knows the answer as well. You know it's if, you yourself don't have the knowledge, the next best thing is to know the person who does have the knowledge".

And along similar lines, a further strategy to deal with information overload was to parcel out responsibilities for knowing certain subject matter among different individuals. Two pertinent quotes are:

"For example, you and I could say we'll divi up how much we know in detail. And I'll know stuff in detail, you'll know stuff in detail. And in a typical way, you'll know what I know and I'll know what you know, and that's all you need to know. That's how you manage ... That to me helps, because those two minute conversations can save you having to read through a ton of articles all on the same thing."; and

"The other way of looking at it is information overload. If you divide the tasks amongst the people that are in the organisation and you could pick out all the areas to get up to speed on ... Get them focused and make them do the job of scanning around. And again, you go to that specific person; you don't have to go to every person in the organisation."

Other research subjects seemed to have dealt with the issue by limiting the amount of information they're exposed to when they no longer have the time or capacity. For example:

"I think information overload could be an issue except that I don't take enough of it on to make it an issue. And I am registered with a few media agencies who send me emails every day and to take all of those onboard would be a situation of information overload. In times when I haven't been working I have enjoyed taking on a lot more information and benefited from it, purely because I've had the time to do that."

The above comments raised the possibility that the issue of information overload and the differences in strategies to deal with that overload could be discriminators of scanning behaviour among individual senior management. Hence, specific questions concerning this were incorporated into the broad based scanning survey. Examples of such questions that were included in the scanning survey, under Q11 and Q12 titled Scanning Behaviour, included: "I think information overload is a greater issue now than 2 years ago"; "I think the capacity of an individual manager to absorb information via scanning falls far short of the volume of information available and is a limiting factor to effective scanning"; "I often feel uneasy because I can't deal with the massive amounts of information I come across"; "I tend to limit the information I'm exposed to when I feel overwhelmed"; and "I will usually change the information mediums I use when I feel overwhelmed by the amount of information I come across".

Related to this issue of information overload were comments on the high use of the internet as an information source. The internet was often described in terms of being useful to firstly detect items of interest, and secondly to further investigate these items, to "drill down" into the information. A relevant comment was:

"If I'm looking for information on a particular subject, my interest has either been engaged by an article that I've seen elsewhere or it's been awhile since I've had a look into that particular aspect and I want to catch up to see what they've been doing, then the internet is my first port of call. It'd be my first port of call for journals, to see what the online offering is, whether there is a searchable feature."

Interestingly, in terms of credibility assignment, high credibility was afforded to the internet as a source, in part, because of the ability to access multiple sources of information and then to cross-reference that information. The internet as a tool and means for scanning for information is becoming increasingly more important, especially for knowledge workers. A common type of comment was as follows:

"If I hear news or an interesting comment on something I'm particularly interested in then I would probably go away and further research it and my primary source for that further research would be the internet. And that would either be looking at online journals, or by looking at a search engine and then directly perhaps the site."

A further comment that supported the increasing role of internet technologies, such as push email and bookmarked URLs (unique resource locator or internet address), in scanning was noted:

“And then just talking to people and they’ll mention something that I haven’t heard before and I’ll go off and do a specific search on the thing that I haven’t learnt about before. And then assuming, as soon as I’ve found a site, if I’ve worked out that that is something that I want to keep learning about, I’ll find a site that really excites me about it and then I’ll subscribe to their newsletter so that I keep getting it, which is why I get so many emails. And then I just keep getting the updates and then I scan through, I read then very quickly, ‘cause all you get now is, pretty much, the title, one sentence of text and the url. So I just wiz down there and if there is anything, you know, that I haven’t read or I don’t know anything about and I want to find out about that article then I click on the urls to see the specific stuff.”

Consideration of the role of technology on scanning behaviour was given through the scanning survey questionnaire. In the survey specific questions were asked about the frequency of receipt of information from internet sources including search engines, company websites, email information subscription services, compared to personal networks of individuals outside your company; traditional mediums such as television, radio, newspaper, business magazines etc.; and company personnel such as superiors, peers, and subordinates. Also, respondents were asked to indicate the extent to which they have changed the way they gather information because of the internet.

Another interesting initial finding of the pilot studies concerned the frequency of scanning activity. Other studies tended to measure frequency using scales such as a one (1) (being never) to five (5) (being once a week) point scale, or categories of daily, weekly, monthly, few times a year, or less than once a year. In the initial results of this study, almost all of the scanning activities described were undertaken very frequently – usually daily or at the least weekly. This was a departure from the frequency of scanning activities reported in other studies. Further research into the frequency of scanning activity was gathered through the scanning survey. Q8 of the survey asked respondents how frequently fifteen different types of environmental information came to their attention; and Q’s 14, 15, and 16 asked how frequently information from different sources was received by them.

One of the major challenges of this research was to understand individual manager’s scanning behaviour in-depth, and then to discern a means to distinguish different scanning behaviours. Within this initial Pilot study it was noted that Research subjects 1 and 2, differed substantially from Research subjects 3 and 4, in terms of the amount of networking that they did. As this may indicate a significant distinguishing feature among scanning behaviour, questions concerning networking were included in the next phase of research, the scanning survey administration. A statistical analysis was subsequently undertaken to identify significant components of scanning behaviour through principal components analysis. For details of the results of this analysis refer to Section 6.2.5, Scanning Behaviour Components.

Finally, in terms of implications for the emerging scanning categorisation scheme, a very significant theme emerged concerned with the propensity to learn and acquire knowledge. In Aguilar's (1967) initial research, four scanning modes were identified (undirected viewing, conditioned viewing, informal search, and formal search) that have often been cited in subsequent studies. One of the major contributions of the four modes is that it recognises that different types of information are sometimes sought, and that these different types of information drive different types of information gathering activities. However, little regard has been paid to what initially influences the type of information that an individual seeks, or indeed the initial motivation that an individual has to seek any information. The theme that strongly emerges from these pilot studies is that some scanning behaviour is essentially motivated by a need to learn and a need to acquire knowledge in context. The following quotes serve as insights:

"... if you just limit yourself (your scanning behaviour) to your immediate job, you're not necessarily exploring other people's domains... not because you need to know about those things but just because the fact that you know would probably command a bit more respect with somebody you want to have a conversation with. So there's an ulterior motive like that. Just being able to have a knowledge conversation with people. I'm not interested in it for its own sake, but I'm sufficiently interested in the people that I want to speak to do that.";

"I think if you get the right sort of person they will be interested in things that go on, they will have an opinion on things that go on. And because they are interested, genuinely interested, then they will look to gather knowledge around those things that interest them in order just to further their own understanding of that situation. So I think those should go hand-in-hand.";

"I think its pretty key to stay on top of things. I think you need to build a basis of learning, basis on which you can make judgments on other issues, and whats gone before, you know, essentially a knowledge base to work from. "; and

"You're going to get a team of people and all they do is scan through for information. Nobody is going to do anything. They are just going to sit there reading. And that can actually get boring after a while, just reading, reading, reading. There's no objective to your learning. What you need is context. You know you can't just keep reading and reading you need to have a purpose. You find stuff that supports your strategy or negates it. You find stuff that's going to change it on its way. And that's all the whole thing about being kinetic, about being able to respond to the stimuli as they're going along".

The area of research concerned with what information senior managers consider salient is ripe for further exploration. Aside from a general learning motivation, as described above, individual research subject's "special interests" may determine salience, as suggested below:

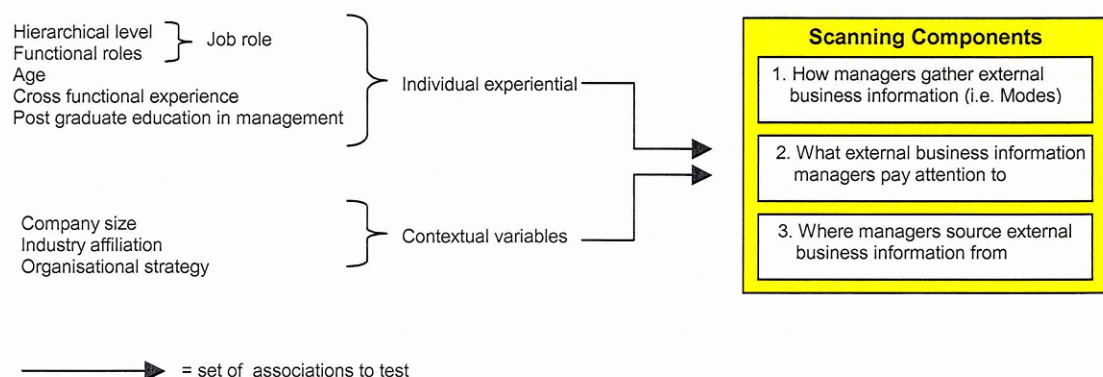
“I suppose amongst the wealth of media the things that grab my attention are about areas that I have specialist interest in. And that would be either because I’ve worked in an industry that’s related to the company that they’re talking about, I’ve worked for that company directly, I’ve looked into that company to work for, or have some personal engagement with that company. Or if it’s in an area that I’m particularly interested in and that could either be through my formal education, or through marketing, or projects that I’ve been involved on in my past. “

The pilot study comments along with a literature review on scanning were helpful to identify sub-topics within scanning for further analysis. For a discussion on the analysis of the above pilot study commentaries and results and the contribution of the pilot study to identifying the sub-topics within scanning for further analysis, refer to Section 7.1, Pilot Study Analysis. The sub-topics ultimately identified were scanning mode adoption; perceived scanning time; strategy process and scanning mode; scanning attention and influences; scanning behaviour typology; technology influence; scanning attention factors; and passive receipt of information. As explained, post the pilot studies a large survey based research effort was undertaken to gather relevant data particular to each of the identified sub-topics. The scope and scale of the survey enabled the findings to be generalised to the managerial community.

6.2 Proposition Results

The following sections 6.2.1 through to 6.2.8 outline the results of the tests performed on the eight key propositions. In each of these following sections a figure is presented to illustrate which part of the initial theoretical framework is being tested. For ease of reference, the initial theoretical framework is re-presented in Figure 13 below. Analytical comments on these results follow in sections 7.2.1 to 7.2.8.

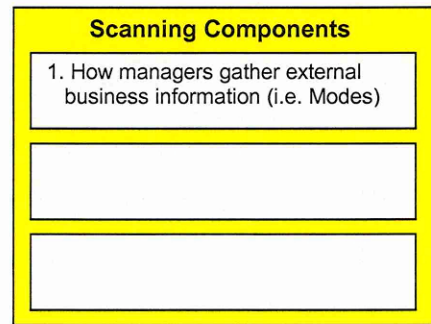
Figure 13: Theoretical framework: Influences on managerial scanning behaviour



6.2.1 Scanning Mode Adoption

The first proposition concerns scanning mode adoption. Scanning modes were represented on the right side of the theoretical framework in Figure 11, in Section 3. The relevant part of the theoretical framework that represents scanning modes is recreated in Figure 14 below.

Figure 14: Theoretical framework: Scanning modes.



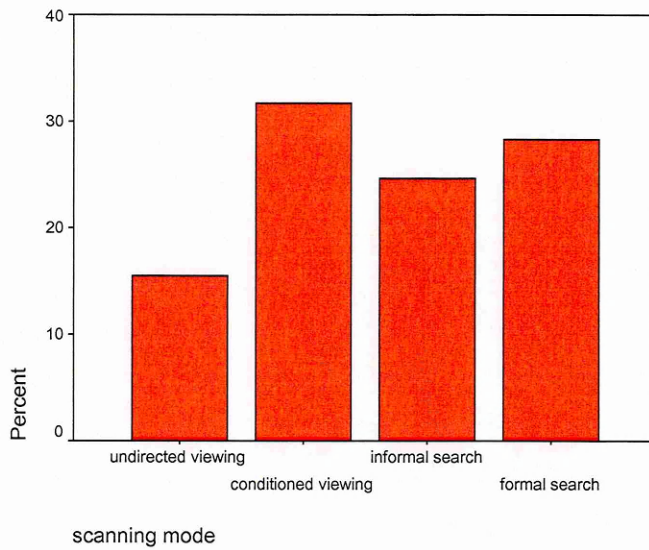
The first proposition concerns whether scanning modes were equally adopted. The scanning modes for the purposes of this test were undirected viewing, conditioned viewing, informal search, and formal search. Based on prior research (Aguilar, 1967), the *a priori* assumption was that scanning modes were equally adopted. Hence, the null hypothesis was stated as: No significant differences exist among the adoption rate of each of the four scanning modes.

Frequency statistics show that the lowest level of adoption level was 15.4% for undirected viewing, and the highest rate level of adoption was 31.7% for conditioned viewing. For further information on the adoption of each scanning mode refer to the below Table 10, Scanning Mode adoption, and the below Figure 15, Percentage of Scanning Mode adoption.

Table 10: Scanning mode adoption.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	undirected viewing	59	15.0	15.4	15.4
	conditioned viewing	121	30.7	31.7	47.1
	informal search	94	23.9	24.6	71.7
	formal search	108	27.4	28.3	100.0
	Total	382	97.0	100.0	
Missing	999	12	3.0		
Total		394	100.0		

Figure 15: Percentage of scanning mode adoption.



The appropriate initial test to apply was a simple chi-square test; a test of whether the observed pattern of events differed significantly from expectations. In this case, the observed pattern of events is the extent of adoption of each of the scanning modes, and the expected pattern was that the number of observations of adoption per scanning mode would be equally distributed. The simple chi-square test run on this data showed that there was a significant difference between the observed number and the expected number with respect to scanning mode adoption ($\chi^2 = 22.419$, $df = 3$, $p < 0.001$). Note that in this test 0 cells (0%) had expected frequencies less than 5. The minimum expected cell frequency was 95.5. Hence, the null hypothesis that there are no significant differences among the adoption rate of each of the four scanning modes was rejected.

The calculation of the residual values is as outlined in Table 11 below. A review of this table shows that undirected viewing observations were significantly lower than expected, conditioned viewing observations were higher than expected, informal search observations approximated expectations, and formal search observations were slightly higher than expected.

Table 11: Calculation of residual from the chi-square test on scanning modes.

	Observed N	Expected N	Residual
undirected viewing	59	95.5	-36.5
conditioned viewing	121	95.5	25.5
informal search	94	95.5	-1.5
formal search	108	95.5	12.5
Total	382		

Based on a cursory review of the above residual table, it is reasonable to expect that the following differences between the scanning modes would be significant: undirected viewing would be significantly lower than conditioned viewing; undirected viewing would be significantly lower than informal search; and undirected viewing would be significantly lower than formal search. This is to be expected because the observations for undirected viewing are obviously much lower than for all the other modes.

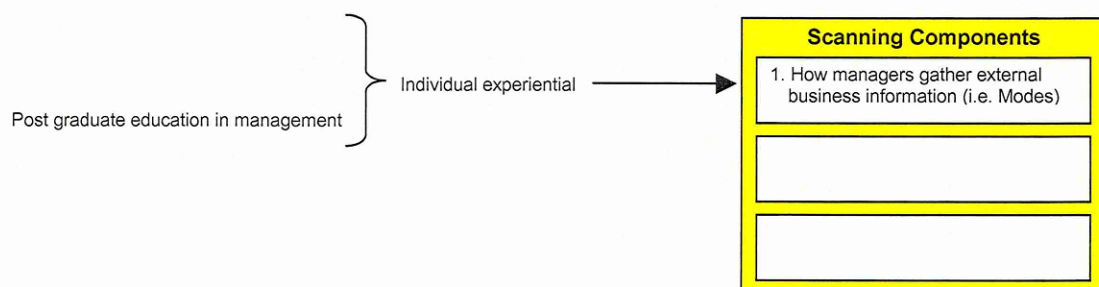
These expected differences were confirmed through a set of simple chi-square tests for each of the above combinations. The results of the simple chi-square tests for these combinations were as follows: for undirected viewing and conditioned viewing there was a significant difference between the observed number and the expected number ($\chi^2 = 21.356$, $df = 1$, $p < 0.001$); for undirected viewing and informal search there was a significant difference between the observed number and the expected number ($\chi^2 = 8.007$, $df = 1$, $p = 0.005$); and for undirected viewing and formal search showed that there was a significant difference between the observed number and the expected number ($\chi^2 = 14.377$, $df = 1$, $p < 0.001$). Note that in all of these tests 0 cells (0%) had expected frequencies less than 5.

For the sake of completeness, a further set of simple chi-square tests were done on all the other possible comparisons of scanning modes. No other significant differences emerged.

Non-MBA and MBA simple chi-square tests

The next set of tests concerned the adoption of scanning modes among the Non-MBA respondents and the MBA respondents. The potential relationship between post graduate education in management and scanning modes was represented in the theoretical framework in Figure 11. The relevant part of this framework concerning this relationship is recreated in Figure 16 below.

Figure 16: Theoretical framework: Scanning modes and post graduate education in management.



The first set of tests done are a separate set of simple chi-square tests on the adoption of scanning modes among the Non-MBA respondents and MBA respondents. This is followed by a specific chi-square test to determine the significance of the difference in scanning modes adopted by Non-MBA respondents compared to MBA respondents.

For the simple chi-square tests the expected pattern was that the number of observations per scanning mode would be equally distributed. The results of the chi-square test for Non-MBAs showed that there was not a significant difference between the observed number and the expected number with respect to scanning mode adoption ($\chi^2 = 6.571$, $df = 3$, $p = 0.087$). For further details on the results of this test including frequency statistics and percentage statistics for the level of adoption of each of the modes, calculation of the residual values (i.e. actual frequency of adoption less expected frequency of adoption), and the results of a further set of simple chi-square tests covering all possible comparisons of scanning modes for Non-MBA respondents, refer to Appendix K, Scanning Modes: Non-MBA adoption statistics and simple chi-square test results.

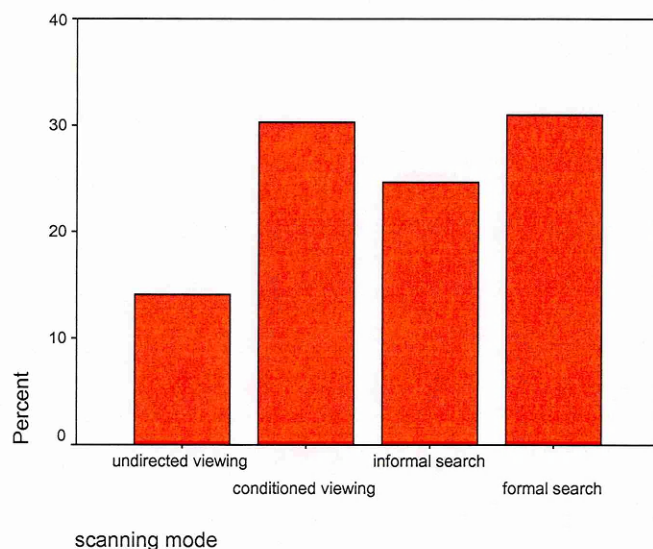
The results of the simple chi-square test for the MBA respondents did show a significant difference between the observed number and the expected number with respect to scanning mode adoption ($\chi^2 = 20.789$, $df = 3$, $p < 0.001$). As this result was significant, some further specific details including frequency statistics and percentage statistics, residual values (i.e. expected frequency of adoption less actual frequency of adoption), and simple chi-square tests for which significant results occurred now follow.

Frequency statistics show that the lowest level of adoption was 14.1% for unconditioned viewing, and that the highest level of adoption was 31.0% for formal search. For further information on the adoption of each scanning mode refer to the below Table 12, MBA Scanning Mode adoption, and the below Figure 17, Percentage of MBA Scanning Mode.

Table 12: MBA Scanning mode adoption.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	undirected viewing	40	13.6	14.1	14.1
	conditioned viewing	86	29.3	30.3	44.4
	informal search	70	23.8	24.6	69.0
	formal search	88	29.9	31.0	100.0
	Total	284	96.6	100.0	
Missing	999	10	3.4		
Total		294	100.0		

Figure 17. Percentage of scanning mode adoption for MBAs.



The calculation of the residual values is as outlined in the below Table 13. The major difference was that the observations of undirected viewing were much lower than expected. Two other notable differences were that observations of formal search were higher than expected and that observations of conditioned viewing were also higher than expected.

Table 13: Calculation of the residual from the simple chi-square test on MBA scanning modes.

	Observed N	Expected N	Residual
undirected viewing	40	71.0	-31.0
conditioned viewing	86	71.0	15.0
informal search	70	71.0	-1.0
formal search	88	71.0	17.0
Total	284		

Based on a cursory review of the above residual table, it is reasonable to expect that the following relative differences between the scanning modes would be significant: undirected viewing would be significantly different to conditioned viewing; undirected viewing would be significantly different to informal search; and undirected viewing would be significantly different to formal search. This is to be expected because the observations for undirected viewing are obviously much lower than for all the other modes. These expected differences were supported through a set of simple chi-square tests for each of the above combinations. The results of the simple chi-square tests for these combinations were as follows: for undirected viewing and conditioned viewing there was a significant difference between the observed number and the expected number ($\chi^2 = 16.794$, $df = 1$, $p < 0.001$); for undirected viewing and informal search

there was a significant difference between the observed number and the expected number ($\chi^2 = 8.182$, $df = 1$, $p = 0.004$); and for undirected viewing and formal search showed that there was a significant difference between the observed number and the expected number ($\chi^2 = 18.000$, $df = 1$, $p < 0.001$). Note that 0 cells (0%) had expected frequencies less than 5.

For the sake of completeness, a further set of simple chi-square tests were done on all the other possible comparisons of scanning modes. No other significant differences emerged.

Non-MBA and MBA chi-square test

As the profiles of scanning modes were clearly different for Non-MBA respondents compared to MBA respondents, a specific test to check whether MBA status was significantly associated with different scanning modes was done.

A specific chi-square test was run to determine the significance of this difference in scanning modes adopted by Non-MBA respondents compared to MBA respondents. The results of the chi-square test showed that MBA status did not have a statistically significant effect on scanning mode adoption ($\chi^2 = 4.890$, $df = 3$, $p = 0.180$). Note that 0 cells (0%) had an expected count less than 5. The minimum expected count was 15.14.

The below Table 14 shows the cross-tabulated results of MBA status and scanning mode adoption. Of particular significance is the percentage (%) of MBAs with degree status who adopt formal search (31%) compared to those managers with Non-MBA status who adopt formal search (20.4%). Also of interest is the percentage (%) of MBAs who adopt undirected viewing (14.1%) compared to those managers with Non-MBA status who adopt undirected viewing (19.4%).

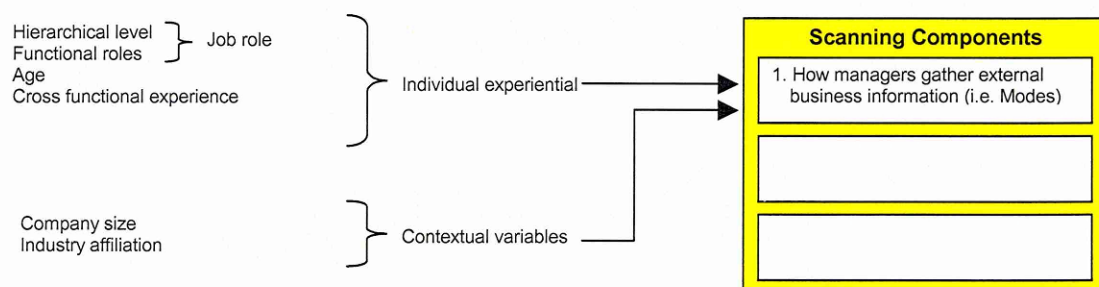
Table 14: MBA degree status and scanning mode adoption cross-tabulated results.

			scanning mode				Total
			undirected viewing	conditioned viewing	informal search	formal search	
MBA degree status	MBA graduate	Count	40	86	70	88	284
		Expected Count	43.9	90.0	69.9	80.3	284.0
		% within MBA degree status	14.1%	30.3%	24.6%	31.0%	100.0%
		% within scanning mode	67.8%	71.1%	74.5%	81.5%	74.3%
		% of Total	10.5%	22.5%	18.3%	23.0%	74.3%
	Non MBA qualified	Count	19	35	24	20	98
		Expected Count	15.1	31.0	24.1	27.7	98.0
		% within MBA degree status	19.4%	35.7%	24.5%	20.4%	100.0%
		% within scanning mode	32.2%	28.9%	25.5%	18.5%	25.7%
		% of Total	5.0%	9.2%	6.3%	5.2%	25.7%
Total	Count		59	121	94	108	382
	Expected Count		59.0	121.0	94.0	108.0	382.0
	% within MBA degree status		15.4%	31.7%	24.6%	28.3%	100.0%
	% within scanning mode		100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total		15.4%	31.7%	24.6%	28.3%	100.0%

Other influencing variables

The next set of tests examined the effect of various influencing variables on scanning mode adoption. The types of tests conducted were chi-square tests. The influencing variables tested for were size of company, hierarchy, functional roles, age, industry affiliation, and cross-functional experience. The potential relationship between these variables and scanning behaviour was represented in the theoretical framework in Figure 11. The relevant part of the theoretical framework concerning these potential relationships is recreated in Figure 18 below.

Figure 18: Theoretical framework: Scanning modes and other influencing variables.



Of the above potential relationships, only industry affiliation had a significant effect on scanning mode adoption. As the results of the chi-square test for industry affiliation were significant some further details now follow.

A specific chi-square test was run to determine whether industry affiliation had a significant effect on scanning mode adoption. Four Industry groups were analysed being: Manufacturing (SIC '92 Code D); Transport, Storage, & Communication (SIC '92 Code I); Financial Intermediation (SIC '92 Code J); and Real estate, renting, & business activities (SIC '92 Code K). The results of the chi-square test showed that industry affiliation had a significant effect on scanning mode adoption ($\chi^2 = 22.008$, $df = 9$, $p = 0.009$). Note that 0 cells (0%) had an expected count less than 5. The minimum expected count was 5.06.

The below Table 15 shows the cross-tabulated results of Industry affiliation and scanning mode adoption. Of particular significance is the high percentage (%) of conditioned viewing within the Manufacturing category (42.5%) and the low adoption of undirected viewing within Real estate, renting, and business activities category (10.9%).

Table 15: Industry affiliation and scanning mode adoption cross-tabulated results.

Industries: 1 = Manufacturing, 2 = Telecommunications, 3 = Financial intermediation, 4 = Other business.

			scanning mode				Total
			undirected viewing	conditioned viewing	informal search	formal search	
Industry	1.00	Count	9	34	13	24	80
		Expected Count	12.7	25.8	19.0	22.5	80.0
		% within Industry man tel fin bus	11.3%	42.5%	16.3%	30.0%	100.0%
		% within scanning mode	18.0%	33.3%	17.3%	27.0%	25.3%
		% of Total	2.8%	10.8%	4.1%	7.6%	25.3%
	2.00	Count	6	10	7	9	32
		Expected Count	5.1	10.3	7.6	9.0	32.0
		% within Industry man tel fin bus	18.8%	31.3%	21.9%	28.1%	100.0%
		% within scanning mode	12.0%	9.8%	9.3%	10.1%	10.1%
		% of Total	1.9%	3.2%	2.2%	2.8%	10.1%
	3.00	Count	22	28	15	20	85
		Expected Count	13.4	27.4	20.2	23.9	85.0
		% within Industry man tel fin bus	25.9%	32.9%	17.6%	23.5%	100.0%
		% within scanning mode	44.0%	27.5%	20.0%	22.5%	26.9%
		% of Total	7.0%	8.9%	4.7%	6.3%	26.9%
	4.00	Count	13	30	40	36	119
		Expected Count	18.8	38.4	28.2	33.5	119.0
		% within Industry man tel fin bus	10.9%	25.2%	33.6%	30.3%	100.0%
		% within scanning mode	26.0%	29.4%	53.3%	40.4%	37.7%
		% of Total	4.1%	9.5%	12.7%	11.4%	37.7%
	Total	Count	50	102	75	89	316
		Expected Count	50.0	102.0	75.0	89.0	316.0
		% within Industry man tel fin bus	15.8%	32.3%	23.7%	28.2%	100.0%
		% within scanning mode	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	15.8%	32.3%	23.7%	28.2%	100.0%

The contingency coefficient was significant ($p = 0.009$) at a value of 0.255 indicating a reasonably high degree of association between industry membership and scanning mode.

Scanning mode categorisation

Based on Aguilar's (1967) research, it was determined that his scanning mode typology essentially comprised two dimensions – purposefulness of search and specificity of information. This was derived through an analysis of the definitions of each mode. These two dimensions were reflected in statements in the survey to which respondents were asked to rate to what degree these statements reflected their behaviour. The two statements best reflecting the two dimensions of purposefulness of search and specificity of information were "I usually seek out clearly identified types of information" and "I don't consciously scan for information unless I have a particular business purpose in mind". There was a significant positive correlation between these

two statements ($r = 0.108$, $n = 385$, $p = 0.034$). This result showed that responses to the two statements were weakly associated.

Further analysis was then undertaken to determine if there was a pattern between the scores on each of the above two dimensions when the responses were grouped by scanning mode. The aim was to explore whether scanning modes were represented by different positions on the two dimensions of purposefulness of search and specificity of information. For example, undirected viewing is a state in which a respondent may not be clear on the types of information they are seeking and not have a particular business purpose in mind; whereas a formal scanning mode is a state in which a respondent is clear on the types of information they are seeking and does have a particular business purpose in mind. The other modes, conditioned viewing and informal search are arguably interim positions on the same two underlying dimensions.

For each of these two dimensions or statements – i.e. “I usually seek out clearly identified types of information” and “I don’t consciously scan for information unless I have a particular business purpose in mind” – the responses were grouped according to whether the research subject’s predominant scanning was undirected viewing, conditioned viewing, informal search, or formal search. Research subjects were asked to indicate the extent to which they agreed with each statement on a one (1) “strongly agree” to seven (7) “strongly disagree” scale. The mean statistics for statement 1, “I usually seek out clearly identified types of information”, for each scanning mode were as follows: undirected viewing (4.69), conditioned viewing (4.89), informal search (4.90), and formal search (5.57). This reflected a pattern of increasing specificity of information in the following order: undirected viewing, conditioned viewing, information search, and formal search. This relationship is consistent with specificity of information being an underlying dimension of scanning modes. The results of a one-way ANOVA (analysis of variance) showed there was a significant effect of scanning mode on responses to the statement “I usually seek out clearly identified types of information” (i.e. specificity of information dimension) ($F_{(3,377)} = 8.746$, $p < 0.001$). Levene’s $p = 0.001$ and therefore a set of Dunnett T3 post-hoc comparison tests were run to identify specific differences between scanning modes. The results showed that the degree of specificity of information for formal search respondents was significantly higher than undirected viewing respondents ($p = 0.001$), conditioned viewing respondents ($p < 0.001$), and informal search respondents ($p < 0.001$).

The mean statistics for statement 2, “I don’t consciously scan for information unless I have a particular business purpose in mind” were as follows: undirected viewing (2.93), conditioned viewing (3.52), informal search (4.02), and formal search (3.71). The general pattern of increasing degrees of purposefulness for search modes compared to viewing modes is reflected in the mean statistics. The results of a one-way ANOVA (analysis of variance) showed there was a significant effect of scanning mode on responses to the statement “I don’t consciously scan for information unless I have a particular business purpose in mind” (i.e. purposefulness of search dimension) ($F_{(3,374)} = 5.209$, $p = 0.002$). Levene’s $p = 0.009$ and therefore a set of Dunnett T3 post-hoc comparison tests were run to identify specific differences between scanning modes. The results showed that the degree of purposefulness of search was

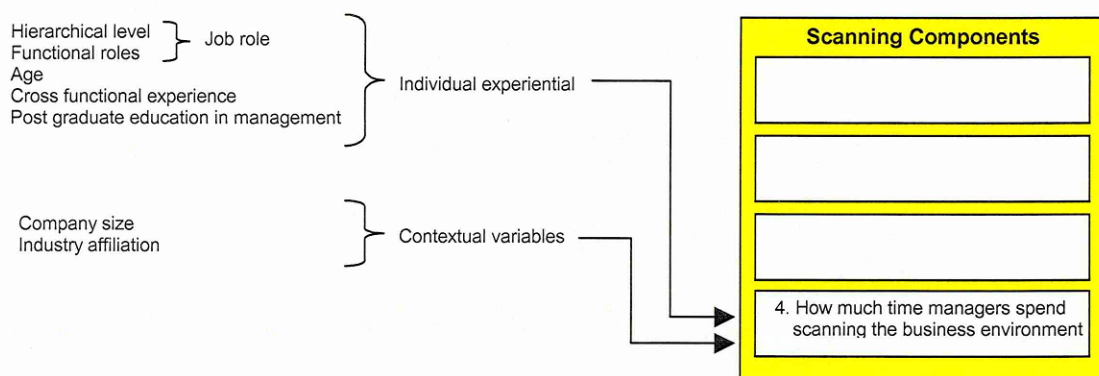
significantly lower for undirected viewing respondents compared to both informal search respondents ($p < 0.001$) and formal search respondents ($p = 0.017$).

Overall, an analysis of the mean statistics for the above two statements by scanning mode and the results of the ANOVA (analysis of variance) tests provided some confirmation that the scanning mode typology derived by Aguilar is based on the two above stated dimensions. Other relevant dimensions and their relative strength to discern respondents in terms of their scanning behaviour are explored in Section 6.2.5, Scanning Behaviour Components.

6.2.2 Perceived Scanning Time

The second proposition concerned the scanning time taken by managers who adopt different scanning modes as their predominant mode. Prior research did not report on the different amount of time spent scanning according to different modes. In fact, the initial theoretical framework for this research, presented in Figure 11 in Section 3, did not reference scanning time. Hence, an amendment to include scanning time as a component of scanning practices was made and is reflected in the right side of Figure 19. Figure 19 also represents the potential relationships between various independent variables and scanning time that were tested and are commented on below.

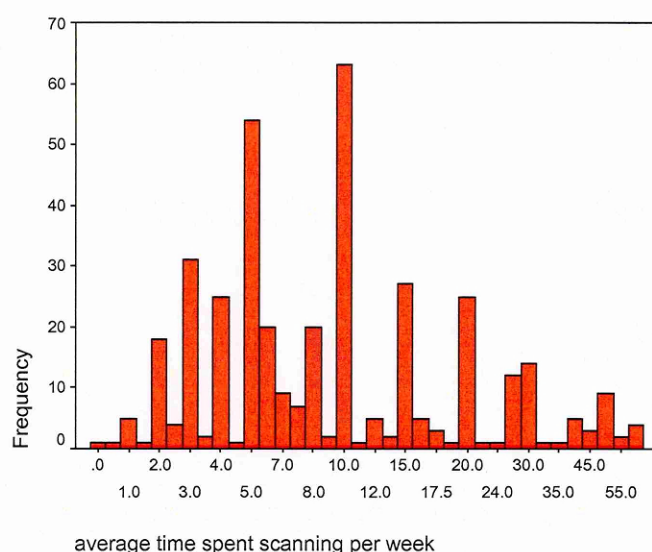
Figure 19: Theoretical framework: Scanning time and influencing variables.



The initial *a priori* assumption was that the time spent scanning was equivalent across modes. Hence, the null hypothesis may be stated as: No significant differences exist among the self-reported time spent scanning across each of the scanning modes.

The first test applied is an ANOVA among perceived time spent scanning across the four different scanning modes. However, prior to running an ANOVA test it was first necessary to review the distribution of the data of scanning time to check for skewness. An initial analysis of the data concerning scanning time showed a distribution that was right skewed as visually represented below in Figure 20.

Figure 20: Average time spent scanning per week.



The skewness of data relating to average time spent scanning per week was confirmed through an analysis of the quartile percentage statistics presented in Table 16. The quartile percentages show moderate increase in the first three quartiles, that is the 25% mark equates to an average of 5 hours of scanning time per week, the 50% mark equates to 8 hours and the 75% mark equates to 15 hours. However the forth quartile shows that the 100% mark equates to 60 hours indicating a greater spread of data to the right side of the distribution than would be reflected in a normal distribution. This was confirmed with a high skewness statistic of 2.061.

Table 16: Statistics relating to perceived average time spent scanning per week.

average time spent scanning per week		
N	Valid	386
	Missing	8
Mean		12.160
Median		8.000
Mode		10.0
Std. Deviation		11.9179
Skewness		2.061
Std. Error of Skewness		.124
Kurtosis		4.277
Std. Error of Kurtosis		.248
Range		60.0
Minimum		.0
Maximum		60.0
Percentiles	25	5.000
	50	8.000
	75	15.000
	95	40.000

As the data was skewed a review to detect and analyse the outlying data records was undertaken. There were 23 data responses beyond the 95th percentile. An analysis of these responses indicated that some respondents may have offered answers that reflected their total work hours and not just those hours consumed by scanning; this seemed particularly true for individuals in analytical and research positions within the financial services industry. Significantly, the 95th percentile equated to 40 hours; a figure approximating the total normal maximum work hours per week (see Table 16 above). Hence, based on the analysis of the individual outlying responses and considering the maximum expected figure for scanning per week, it was determined that the perceived scanning time data above the 95th percentile was the appropriate outlier benchmark. Hence, all outlier data results that fell beyond 95th percentile were discarded from the subsequent analysis. Key statistics following removal of outliers beyond the 95th percentile are presented in the below Table 17.

Table 17: Excluding outliers: statistics relating to perceived average time spent scanning per week.

average time spent scanning per week		
N	Valid	363
	Missing	0
Mean		9.804
Median		8.000
Mode		10.0
Std. Deviation		7.4044
Skewness		1.260
Std. Error of Skewness		.128
Kurtosis		.953
Std. Error of Kurtosis		.255
Range		35.0
Minimum		.0
Maximum		35.0
Percentiles	25	5.000
	50	8.000
	75	15.000
	95	25.000

After outlier detection and removal, statistics to describe the number of valid observations per scanning mode, the mean of perceived average time spent scanning per week, the standard deviation, the standard error, the 95% confidence interval for mean lower and upper bound, and the minimum and maximum scores were determined as summarised in Table 18 below.

Table 18: Statistics on perceived average time spent scanning per week by scanning mode.

average time spent scanning per week								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
undirected viewing	56	9.241	7.2732	.9719	7.293	11.189	2.0	30.0
conditioned viewing	112	8.951	7.1203	.6728	7.618	10.284	.5	35.0
informal search	90	8.300	6.1748	.6509	7.007	9.593	.0	30.0
formal search	96	12.144	8.1984	.8367	10.483	13.805	1.0	30.0
Total	354	9.697	7.3635	.3914	8.927	10.467	.0	35.0

The Null hypothesis in this ANOVA test was stated as: $H_0: \mu_i = \mu_j$ for all i, j . $\mu_1 = \mu_2 = \mu_3 = \mu_4$, where μ = mean of perceived scanning time per week per scanning mode; 1 = unconditioned viewing mode, 2 = conditioned viewing mode, 3 = informal search mode, and 4 = formal search mode. The alternative hypothesis is $H_1: \mu_i \neq \mu_j$ for any i, j .

The results on the ANOVA test indicate that type of scanning mode does effect the average perceived weekly scanning time ($F_{(3,350)} = 5.251$, $p = 0.001$). Hence, the null hypothesis, H_0 , is rejected.

Once the null hypothesis was rejected an analysis was performed to specifically identify significant variances between each of the scanning mode groups. A Levene's p statistic was calculated. In instances where Levene's $p < 0.05$, equality of variances was not assumed and Dunnett T3 post-hoc comparison tests were run. In instances where Levene's $p > 0.05$, equality of variance was assumed and Tukey post-hoc comparison tests were run. These rules determining which type of post-hoc comparison test to run were consistently applied throughout this research.

With respect to the above average time spent scanning per week by scanning mode, Levene's $p = 0.010$. The results of the Dunnett T3 post-hoc comparison tests identified two significant differences: perceived time spent scanning in conditioned mode was significantly lower than in formal search ($p = 0.020$); and perceived time spent scanning in informal mode was significantly lower than in formal mode ($p = 0.002$).

An analysis was then done to determine the percentage of variance in perceived average time spent scanning per week that was accounted for by the type of scanning mode adopted. The appropriate statistic was an Omega squared where ω^2 (Omega squared) = $(SS_{\text{between groups}} - (df_{\text{between groups}} * \Pi_{\text{square within groups}}) / SS + \Pi_{\text{square within groups}})$. Applying the Omega square formula = $824.35 - (3 * 52.33) / (19,139.98 + 52.33) = 0.03$. Hence, 3% of the variance in perceived average time spent scanning per week was accounted for by the type of scanning mode adopted.

Other influencing variables

Further analysis was then undertaken to explore for significant differences in perceived time spent scanning per week by different sub-groups of managers. Sub-groups were

determined by on criteria of affiliation to different sized companies; hierarchical levels; functional roles; age; industry affiliations; degree of cross-functional experience, and MBA and Non-MBA status.

One-way ANOVA tests were run for each of the above potential influencing variables to determine whether they had a significant effect on time spent scanning per week. Significant results emerged for the variables of size of company, functional roles, and MBA status. Further details of the test results for these significant outcomes now follow.

Size of company

A one-way ANOVA was run to test whether size of company had a significant effect on the perceived time spent scanning per week. Companies were split into three different levels: level 1 equated to revenue up to £10m; level 2 equated to revenue from £11m to £100m; and level 3 £101m and higher.

The basic descriptive statistics including number of observations, mean, standard deviation, standard error, 95% confidence interval for the mean lower and upper bound, and minimum and maximum recorded entries, for each of the three different sized companies' categories, is presented in Table 19 below.

Table 19: Size of company and perceived average time spent scanning per week.

average time spent scanning per week								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	82	10.061	7.8490	.8668	8.336	11.786	.5	32.0
2.00	95	7.982	6.0585	.6216	6.748	9.216	.0	30.0
3.00	174	10.563	7.7662	.5888	9.401	11.725	1.0	35.0
Total	351	9.747	7.4248	.3963	8.968	10.527	.0	35.0

The results of a one-way ANOVA (analysis of variance) showed there was a significant effect of size of company on perceived average time spent scanning per week ($F_{(2,348)} = 3.871$, $p = 0.022$). Levene's $p = 0.037$ and therefore a set of Dunnett T3 post-hoc comparison tests were run to identify specific differences between scanning modes. The results showed that the perceived time spent scanning per week for managers in medium sized companies was significantly less than those in larger sized companies ($p = 0.009$)

An analysis was then done to determine the percentage of variance in perceived average time spent scanning per week that was accounted for by size of company. The appropriate statistic was an Omega squared where ω^2 (Omega squared) = $(SS_{\text{between groups}} - (df_{\text{between groups}} * \Pi_{\text{square within groups}}) / SS + \Pi_{\text{square within groups}})$. Applying the Omega square formula = $419.92 - (2 * 54.238) / (19,294.77 + 54.238) = 0.016$. Hence, 1.6% of the variance in perceived average time spent scanning per week was accounted for by size of company.

Functional roles

A one-way ANOVA was run to test whether functional roles had a significant effect on the perceived time spent scanning per week. Functional roles comprised 4 groups: general management, business development, operations, and support.

The basic descriptive statistics including number of observations, mean, standard deviation, standard error, 95% confidence interval for the mean lower and upper bound, and minimum and maximum recorded entries, for each of the four different functional roles, are presented in Table 20 below.

Table 20: Functional roles and perceived average time spent scanning per week.

average time spent scanning per week								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	167	9.286	7.2465	.5607	8.179	10.393	.5	32.0
2.00	94	11.628	8.3791	.8642	9.911	13.344	.0	35.0
3.00	42	10.952	7.0830	1.0929	8.745	13.160	2.5	30.0
4.00	57	7.754	5.6388	.7469	6.258	9.251	1.0	30.0
Total	360	9.849	7.4144	.3908	9.081	10.618	.0	35.0

The results of a one-way ANOVA (analysis of variance) showed there was a significant effect of functional role on perceived average time spent scanning per week ($F_{(3,356)} = 4.051$, $p = 0.007$). Levene's $p < 0.001$ and therefore a set of Dunnett T3 post-hoc comparison tests were run to identify specific differences between scanning modes. The results showed that the perceived time spent scanning per week for managers in business development was significantly more than for managers in support functions ($p = 0.005$).

An analysis was then done to determine the percentage of variance in perceived average time spent scanning per week that was accounted for by functional area. The appropriate statistic was an Omega squared where ω^2 (Omega squared) = $(SS_{\text{between groups}} - (df_{\text{between groups}} * \Pi_{\text{square within groups}}) / SS + \Pi_{\text{square within groups}})$. Applying the Omega square formula = $651.49 - (3 * 53.606) / (19,735.28 + 53.606) = 0.025$. Hence, 2.5% of the variance in perceived average time spent scanning per week was accounted for by functional group.

MBA and Non-MBA status

An independent samples t-test was run to test whether MBA status had a significant effect on the perceived time spent scanning per week.

The basic descriptive statistics including number of observations, mean, standard deviation, standard error, 95% confidence interval for the mean lower and upper bound, and minimum and maximum recorded entries for managers with MBA status and Non-MBA status are presented in Table 21 below.

Table 21: MBA status and perceived average time spent scanning per week.

average time spent scanning per week								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
MBA graduate	271	10.302	7.7158	.4687	9.379	11.225	.0	35.0
Non MBA qualified	92	8.337	6.2080	.6472	7.051	9.623	1.0	30.0
Total	363	9.804	7.4044	.3886	9.040	10.568	.0	35.0

The results of the t-test showed that there was a significant effect of MBA status on perceived average time spent scanning per week ($t = 2.459$, $df = 193$, $p = 0.015$). Levene’s $p = 0.023$ and therefore equality of variance was not assumed. It is apparent from the descriptive table that the perceived time spent scanning per week was significantly more for managers with MBA status than for those without ($p = 0.015$).

An analysis was then done to determine the percentage of variance in perceived average time spent scanning per week that was accounted for by MBA status. The appropriate statistic was an Omega squared where ω^2 (Omega squared) = $(SS_{\text{between groups}} - (df_{\text{between groups}} * \Pi_{\text{squarewithin groups}}) / SS + \Pi_{\text{squarewithin groups}})$. Applying the Omega square formula = $265.171 - (1 * 54.242) / (19,846.47 + 54.242) = 0.015$. Hence, 1.5% of the variance in perceived average time spent scanning per week is accounted for by MBA status.

Testing for confounding variables

Tests were also done to check whether some of the significant results on perceived time spent scanning per week were impacted by confounding variables. To recap, the results of the above ANOVA and post-hoc comparison tests were that scanning mode, functional roles, size of company, and MBA status significantly impacted on perceived time spent scanning.

The scanning mode variable reflects an individual’s behaviour in terms of the two dimensions of purposefulness of search and specificity of information as discussed in Section 6.2.1, Scanning Mode Adoption. This variable is relatively distinct and separate from the other variables analysed, i.e. functional roles, size of company, and MBA status. This was confirmed in the earlier section that tested for significant associations between scanning mode and the variables of size of company, hierarchy, functional roles, age, industry affiliation, cross-functional experience, and MBA status, using chi-squared tests. These tests showed that only industry membership was significantly associated with scanning mode adoption. As industry affiliation is not one of the significant variables influencing perceived time spent scanning per week, and as the variables of functional roles, size of company, and MBA status were not significantly related to scanning mode, then the scanning mode variable was considered a unique and separate variable whose influence on perceived time spent scanning was not obviously confounded by any of the other independent variables.

Therefore, further consideration of confounding effects were restricted to the other significant variables influencing perceived time spent scanning per week – i.e. functional role, size of company, and MBA status. The first variable analysed for

confounding effects was functional role. The prior analysis showed that business development personnel scanned significantly more than support company personnel. An analysis of the percentage (%) of MBAs versus Non-MBAs within business development and support functions was undertaken. This showed that there was a higher percentage of MBAs in business development function (78.7%) than within the Support function (57.9%). Refer to below Table 22 for details.

Table 22: MBA degree status and functional groups of business development and support.

			Functional experience groups				Total
			1.00	2.00	3.00	4.00	
MBA degree status	MBA graduate	Count	131	74	33	33	271
		% within MBA degree status	48.3%	27.3%	12.2%	12.2%	100.0%
		% within Functional experience groups	78.4%	78.7%	78.6%	57.9%	75.3%
		% of Total	36.4%	20.6%	9.2%	9.2%	75.3%
	Non MBA qualified	Count	36	20	9	24	89
		% within MBA degree status	40.4%	22.5%	10.1%	27.0%	100.0%
		% within Functional experience groups	21.6%	21.3%	21.4%	42.1%	24.7%
		% of Total	10.0%	5.6%	2.5%	6.7%	24.7%
Total		Count	167	94	42	57	360
		% within MBA degree status	46.4%	26.1%	11.7%	15.8%	100.0%
		% within Functional experience groups	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	46.4%	26.1%	11.7%	15.8%	100.0%

A review of the descriptive statistics on Functional Roles and perceived average time spent scanning per week, recreated at Table 23 below, shows the mean time spent scanning by senior managers within business development was 11.628 whereas within the support function it was 7.754. It is this difference that contributed to the significant one-way ANOVA results ($F_{(3,356)} = 4.051$, $p = 0.007$) and was statistically significant according to the Dunnett T3 post-hoc comparison test ($p = 0.005$).

Table 23: Functional roles and perceived average time spent scanning per week.

Functions: 1 = General management, 2 = Business development, 3 = Operations, 4 = Support.

average time spent scanning per week									
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	
					Lower Bound	Upper Bound			
1.00	167	9.286	7.2465	.5607	8.179	10.393	.5	32.0	
2.00	94	11.628	8.3791	.8642	9.911	13.344	.0	35.0	
3.00	42	10.952	7.0830	1.0929	8.745	13.160	2.5	30.0	
4.00	57	7.754	5.6388	.7469	6.258	9.251	1.0	30.0	
Total	360	9.849	7.4144	.3908	9.081	10.618	.0	35.0	

A further breakdown analysis of the relationship between functional roles and perceived average time spent scanning was then done separately for the two groups of

interest – MBAs and Non-MBAs. Table 24 is a summary of the relationship between functional roles and perceived average time spent scanning for MBAs.

Table 24: MBAs: Functional roles and perceived average time spent scanning per week.

Functions: 1 = General management, 2 = Business development, 3 = Operations, 4 = Support.

average time spent scanning per week									
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	
					Lower Bound	Upper Bound			
1.00	131	9.777	7.5199	.6570	8.477	11.077	.5	32.0	
2.00	74	11.892	8.7497	1.0171	9.865	13.919	.0	35.0	
3.00	33	11.061	7.4601	1.2986	8.415	13.706	2.5	30.0	
4.00	33	8.061	5.4354	.9462	6.133	9.988	1.0	30.0	
Total	271	10.302	7.7158	.4687	9.379	11.225	.0	35.0	

A separate ANOVA test showed that there was not a significant difference between the mean values for this MBA group ($F_{(3,267)} = 2.317$, $p = 0.076$).

An analysis was then performed on the relationship between functional roles and perceived average time spent scanning for the Non-MBA respondents, as presented in Table 25.

Table 25: Non-MBAs: Functional roles and perceived average time spent scanning per week.

Functions: 1 = General management, 2 = Business development, 3 = Operations, 4 = Support.

average time spent scanning per week									
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	
					Lower Bound	Upper Bound			
1.00	36	7.500	5.9016	.9836	5.503	9.497	1.0	30.0	
2.00	20	10.650	6.9455	1.5531	7.399	13.901	3.0	25.0	
3.00	9	10.556	5.8547	1.9516	6.055	15.056	4.0	20.0	
4.00	24	7.333	5.9994	1.2246	4.800	9.867	1.0	30.0	
Total	89	8.472	6.2493	.6624	7.155	9.788	1.0	30.0	

A separate ANOVA test showed that there was not a significant difference between the mean values for this Non-MBA group ($F_{(3,85)} = 1.742$, $p = 0.165$).

Upon analysis of the above tables, it is immediately noticeable that MBAs scan consistently more than Non-MBAs within all of the four different functional areas. The fact that MBAs scan more than Non-MBAs was already determined in a prior t-test; the further finding of interest here is the consistent higher level of scanning by MBAs compared to Non-MBAs which extends across all of the functional areas.

An analysis of the above tables shows that the reason the overall average perceived time spent scanning in business development is relatively high at 11.628 hours is due to the high average perceived time spent scanning by MBAs in business development at 11.829. The low overall average perceived time spent scanning in support functions of 7.754 is due to relatively low average perceived time spent scanning by Non-MBAs

in support functions at 7.333. This analysis, and the separate ANOVA results, indicates that it is not solely the MBA or Non-MBA results regarding perceived time spent scanning that are contributing to the overall significant relationship between size of company and perceived time spent scanning. Instead it is a combination of the two groups impacting to record a high average time spent scanning in business development and a low relative time spent scanning in support functions. Further, the mix of MBAs and Non-MBAs in business development and support functions differs as already noted above. The mix of MBAs and Non-MBAs of 78.7% and 21.3% in business development respectively approximately reflects the sample mix in this research of 75% MBAs and 25% Non-MBAs. However, the mix of MBAs and Non-MBAs in support function of 57.9% and 42.1% respectively differs from the sample mix of respondents in this research overall. The lower relatively percentage mix of MBAs in functional support compared to business development is not an unexpected result and is worth noting as one of the contributing factors to the overall result. It remains valid to conclude that there is a statistically significant relationship between functional roles and perceived average time spent scanning per week, allowing for a higher percentage of Non-MBAs in support functions.

The next variable to consider for confounding effects was size of company. Based on the prior analysis, the perceived time spent scanning per week for managers in medium sized companies was significantly less those in larger sized companies ($p = 0.017$). An analysis was then done to check the percentage of MBAs in different sized companies. If there were relatively more MBAs in larger sized companies then this could be a confounding effect. The cross-tabulation analysis of MBA status compared to size of company showed that there was a slightly high percentage of MBAs in large companies (77%) compared to mid-sized companies (64.2%). However, it was also noticed that this trend was not systematic. In this respondent group, the largest percentage of MBAs (85.4%) were employed in smaller sized companies. Refer to Table 26 for details.

Table 26: MBA status and size of company cross-tabulation.

			Size of company low med high			Total
			1.00	2.00	3.00	
MBA degree status	MBA graduate	Count	70	61	134	265
		Expected Count	61.9	71.7	131.4	265.0
		% within MBA degree status	26.4%	23.0%	50.6%	100.0%
		% within Size of company low med high	85.4%	64.2%	77.0%	75.5%
		% of Total	19.9%	17.4%	38.2%	75.5%
	Non MBA qualified	Count	12	34	40	86
		Expected Count	20.1	23.3	42.6	86.0
		% within MBA degree status	14.0%	39.5%	46.5%	100.0%
		% within Size of company low med high	14.6%	35.8%	23.0%	24.5%
		% of Total	3.4%	9.7%	11.4%	24.5%
Total		Count	82	95	174	351
		Expected Count	82.0	95.0	174.0	351.0
		% within MBA degree status	23.4%	27.1%	49.6%	100.0%
		% within Size of company low med high	100.0%	100.0%	100.0%	100.0%
		% of Total	23.4%	27.1%	49.6%	100.0%

A review of the descriptive statistics on size of company and perceived average time spent scanning per week, presented in Table 27 below, shows the mean time spent scanning by senior managers within large companies is 10.563 whereas in medium sized companies it is 7.982. It is this difference that contributed to the significant one-way ANOVA results ($F_{(2,348)} = 3.871$, $p = 0.022$) and was statistically significant according to the Dunnett T3 post-hoc comparison test ($p = 0.009$).

Table 27: Size of company and perceived average time spent scanning per week.

Size of company: 1 = Small, 2 = Medium, 3 = Large.

average time spent scanning per week								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	82	10.061	7.8490	.8668	8.336	11.786	.5	32.0
2.00	95	7.982	6.0585	.6216	6.748	9.216	.0	30.0
3.00	174	10.563	7.7662	.5888	9.401	11.725	1.0	35.0
Total	351	9.747	7.4248	.3963	8.968	10.527	.0	35.0

A further breakdown analysis of the relationship between size of company and perceived average time spent scanning was then done separately for the two groups of interest – MBA graduates and Non-MBAs. Table 28 is a summary of the relationship between size of company and perceived average time spent scanning for MBAs.

Table 28: MBAs: Size of company and perceived average time spent scanning per week.

Size of company: 1 = Small, 2 = Medium, 3 = Large.

average time spent scanning per week								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	70	10.200	7.9534	.9506	8.304	12.096	.5	32.0
2.00	61	7.857	6.1348	.7855	6.286	9.429	.0	30.0
3.00	134	11.250	8.0613	.6964	9.873	12.627	1.0	35.0
Total	265	10.192	7.7235	.4745	9.258	11.126	.0	35.0

A separate ANOVA test showed that there was significant difference between the mean values for this MBA group ($F_{(2,262)} = 4.140, p = 0.017$).

An analysis was then performed on the relationship between size of company and perceived average time spent scanning for the Non-MBA respondents, as per the below Table 29.

Table 29: Non-MBAs: Size of Company and perceived average time spent scanning per week.

Size of company: 1 = Small, 2 = Medium, 3 = Large.

average time spent scanning per week								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	12	9.250	7.4848	2.1607	4.494	14.006	3.0	30.0
2.00	34	8.206	6.0039	1.0297	6.111	10.301	2.0	30.0
3.00	40	8.263	6.2357	.9860	6.268	10.257	1.0	25.0
Total	86	8.378	6.2619	.6752	7.035	9.720	1.0	30.0

A separate ANOVA test showed that there was not a significant difference between the mean values for this Non-MBA group ($(F_{(2,83)} = 0.133, p = 0.875)$).

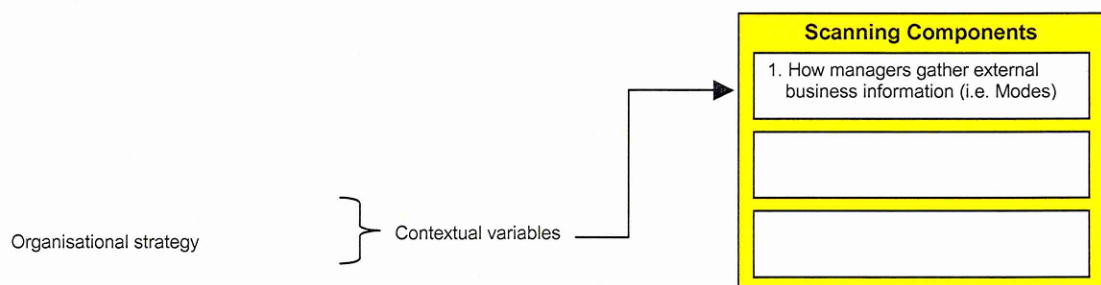
An analysis of the above tables shows that the reason that the overall average perceived time spent scanning in large companies is relatively high at 10.563 hours is due to the high average time spent by MBAs in large companies at 11.250. The low overall average time spent scanning in medium sized companies of 7.982 is due to relatively low time spent by MBAs in medium sized companies at 7.857. This analysis, and the separate ANOVA results, indicates that it is the MBA results regarding perceived time spent scanning that are contributing to the overall significant relationship between size of company and time spent scanning. Further, the mix of MBAs and Non-MBAs in the large and medium sized companies differs as already noted above. The mix of MBAs and Non-MBAs of 77% and 23% in large companies respectively approximately reflects the sample mix in this research of 75% MBAs and 25% Non-MBAs. However, the mix of MBAs and Non-MBAs in medium sized companies of 64% and 36% differs from the sample mix of respondents in this research overall. The lower relative percentage mix of MBAs in medium sized companies compared to larger sized companies is not an unexpected result and is worth noting as one of the contributing factors to the overall result. It remains valid to

conclude that there is a statistically significant relationship between size of company and perceived average time spent scanning per week, albeit it is driven by variances in time according to MBA respondents and the mix of MBA respondents across medium and large sized companies.

6.2.3 Strategy Process and Scanning Mode

The third proposition concerned the perceived organisational strategy process and scanning modes. The potential relationship between strategy process and scanning modes was represented in the theoretical framework in Figure 11. The relevant part of this framework concerning this relationship is recreated in Figure 21 below.

Figure 21: Theoretical framework: Scanning modes and strategy process.



The initial assumption was that there may be a set of relationships between perceived strategy process and scanning mode adoption. Hence, the null hypothesis may be stated as: No significant relationships exist between the perceived strategy process and adoption of scanning mode.

The scanning survey contained three questions that strongly reflected three different types of strategy processes: visionary, planning, and emergent. The three key respective strategy process statements were: 1) “The strategy we follow is directed by a vision of the future associated with the chief executive (or another senior figure)”; 2) “We have well defined planning procedures to search for solutions to strategic problems”; and 3) “We tend to develop strategy by experimenting and trying new approaches in the market place”. These statements are extracts from research concerned with validating multi-dimensional measures of strategy development processes (Bailey, Johnson, & Daniels, 2000).

Respondents were stratified into three groups for each statement: those that answered with relatively high scores, medium scores, and low scores. The cut-off point to separate high scores, medium scores and low scores on each of these three statements was determined by reviewing the frequency statistics to identify the approximate 33% percentile and 66% percentile. The appropriate cut off points to stratify respondents into three groups for the planning strategy process was determined to be 1 and 2 for the low scores, 3 and 4 for the medium scores, and 5, 6, and 7 for the high scores.

The next step in the analysis was to test for an association between the two variables, planning strategy process and scanning modes. A cross-tab analysis and chi-square test was therefore performed. The results of the cross-tabulation, for which there were 379 valid cases, is presented in the below Table 30. In this test, the relationship of interest was whether managers who rated high on planning strategy process would engage in significantly higher levels of formal search scanning.

Table 30: Planning strategy process and scanning mode cross-tabulation.

			scanning mode				Total
			undirected viewing	conditioned viewing	informal search	formal search	
Strategy process planning	1.00 Low	Count	14	33	35	23	105
		Expected Count	16.3	33.2	25.8	29.6	105.0
		% within Strategy process planning	13.3%	31.4%	33.3%	21.9%	100.0%
		% within scanning mode	23.7%	27.5%	37.6%	21.5%	27.7%
		% of Total	3.7%	8.7%	9.2%	6.1%	27.7%
	2.00 Med	Count	25	37	34	33	129
		Expected Count	20.1	40.8	31.7	36.4	129.0
		% within Strategy process planning	19.4%	28.7%	26.4%	25.6%	100.0%
		% within scanning mode	42.4%	30.8%	36.6%	30.8%	34.0%
		% of Total	6.6%	9.8%	9.0%	8.7%	34.0%
	3.00 High	Count	20	50	24	51	145
		Expected Count	22.6	45.9	35.6	40.9	145.0
		% within Strategy process planning	13.8%	34.5%	16.6%	35.2%	100.0%
		% within scanning mode	33.9%	41.7%	25.8%	47.7%	38.3%
		% of Total	5.3%	13.2%	6.3%	13.5%	38.3%
	Total	Count	59	120	93	107	379
		Expected Count	59.0	120.0	93.0	107.0	379.0
		% within Strategy process planning	15.6%	31.7%	24.5%	28.2%	100.0%
		% within scanning mode	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	15.6%	31.7%	24.5%	28.2%	100.0%

The chi-square test run on this data showed that there was a significant association between perceived levels of adoption of planning strategy process and the scanning mode adopted ($\chi^2 = 14.099$, $df = 6$, $p = 0.029$). The data shows that within planning strategy process group 3 ("high scores") the percentage of formal search adoption is high at 35.2%; this is significantly higher than the percentage of formal search adoption within planning strategy process group 1 ("low score") at 21.9%. These overall test results support rejecting the null hypothesis that there is no association between planning strategy process and scanning modes.

A similar analysis was then performed to test for an association between emergent strategy process and scanning modes. This involved a cross-tab analysis and chi-square test. The chi-square test results showed that there was not a significant relationship between perceived levels of adoption of emergent strategy process and the scanning mode adopted ($\chi^2 = 8.529$, $df = 6$, $p = 0.202$). To review the cross-tabulation results refer to Appendix L, Strategy process and scanning mode chi-square test results.

An exercise was also done to test for a relationship between visionary strategy process and scanning modes. A cross-tab analysis and chi-square test was therefore performed.

The chi-square test results showed that there was not a significant relationship between a visionary strategy process and the scanning mode adopted ($\chi^2 = 8.013$, $df = 6$, $p = 0.237$). To review the cross-tabulation results refer to Appendix L, Strategy process and scanning mode chi-square test results.

Top-tier manager results

Further tests were then done on the responses from the top-tier of managers, i.e. those whose job position in an organisation was 0 or 1 levels below the CEO or MD position. Tests were undertaken for these top-tier managers as a separate group on the basis that the relationship between a type of strategy process and scanning modes may be more significant within the top-tier manager group. This may be the case due to the familiarity and understanding that top-tier managers have regarding their organisation's strategy process. Also, if top-tier managers have been intimately involved in the creation of the strategy process, their ownership and resulting actions, including their scanning behaviour, may be more closely aligned with the strategy process. If so, then a significant interaction between strategy process and scanning modes may emerge. The analysis was conducted for all three strategy processes previously considered, i.e. planning strategy process, emergent strategy process, and visionary strategy process.

The first additional analysis for top-tier managers was done to test for an association between planning strategy process and scanning modes. Top-tier manager respondents were stratified into three groups: those that answered with relatively high, medium, and low scores. The cut-off point for high, medium, and low scores on strategy process planning was determined by reviewing the frequency statistics. The appropriate cut-off points to stratify top-tier respondents into two groups was determined to be 1 and 2 for the low scores; 2 and 3 for the medium scores; and 4, 5, 6, and 7 for the high scores.

The next step in the analysis was to test for an association between the two variables, planning strategy process and scanning modes. A cross-tab analysis and chi-square test was therefore performed. The results of the cross-tabulation, for which there were 108 valid cases, is presented in the below Table 31. In this test, the relationship of interest was whether top-tier managers who rated high on planning strategy process would engage in significantly higher levels of formal search scanning.

Table 31: Top-tier manager planning strategy process and scanning mode cross-tabulation.

			scanning mode				Total
			undirected viewing	conditioned viewing	informal search	formal search	
Strategy planning top tier	1.00 Low	Count	5	18	10	3	36
		Expected Count	7.0	14.3	7.0	7.7	36.0
		% within Strategy planning top tier	13.9%	50.0%	27.8%	8.3%	100.0%
		% within scanning mode	23.8%	41.9%	47.6%	13.0%	33.3%
		% of Total	4.6%	16.7%	9.3%	2.8%	33.3%
	2.00 Med	Count	11	10	7	9	37
		Expected Count	7.2	14.7	7.2	7.9	37.0
		% within Strategy planning top tier	29.7%	27.0%	18.9%	24.3%	100.0%
		% within scanning mode	52.4%	23.3%	33.3%	39.1%	34.3%
		% of Total	10.2%	9.3%	6.5%	8.3%	34.3%
	3.00 High	Count	5	15	4	11	35
		Expected Count	6.8	13.9	6.8	7.5	35.0
		% within Strategy planning top tier	14.3%	42.9%	11.4%	31.4%	100.0%
		% within scanning mode	23.8%	34.9%	19.0%	47.8%	32.4%
		% of Total	4.6%	13.9%	3.7%	10.2%	32.4%
	Total	Count	21	43	21	23	108
		Expected Count	21.0	43.0	21.0	23.0	108.0
		% within Strategy planning top tier	19.4%	39.8%	19.4%	21.3%	100.0%
		% within scanning mode	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	19.4%	39.8%	19.4%	21.3%	100.0%

The chi-square test run on this data showed that there was a significant association between perceived levels of adoption of planning strategy process and the scanning mode adopted ($\chi^2 = 12.737$, $df = 6$, $p = 0.047$). The data shows that within planning strategy process group 3 (“high scores”) the percentage of formal search adoption is high at 31.4%; this is significantly higher than the percentage of formal search adoption within planning strategy process group 1 (“low score”) at 8.3%. These overall test results support rejecting the null hypothesis that there is no association between strategy process planning and scanning modes.

A similar analysis was then performed to test for an association between top-tier manager emergent strategy process and scanning modes. This involved a cross-tab analysis and chi-square test. The chi-square test results showed that there was not a significant relationship between perceived levels of adoption of emergent strategy process and the scanning mode adopted ($\chi^2 = 2.121$, $df = 3$, $p = 0.548$). To review the cross-tabulation results refer to Appendix L, Strategy process and scanning mode chi-square test results.

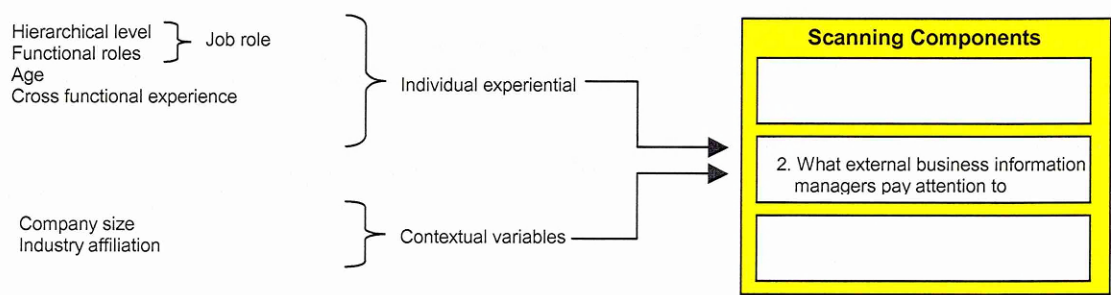
An exercise was also done to test for a relationship between top-tier manager visionary strategy process and scanning modes. A cross-tab analysis and chi-square test was therefore performed. The chi-square test results showed that there was not a significant relationship between perceived levels of adoption of visionary strategy process and the scanning mode adopted ($\chi^2 = 0.478$, $df = 3$, $p = 0.924$). To review the cross-tabulation

results refer to Appendix L, Strategy process and scanning mode chi-square test results.

6.2.4 Scanning Attention and Influences

The fourth proposition concerned the level of scanning attention that senior management paid to different sub-sectors within the environment. The related tests examined the effect of various influencing variables on what external business information managers pay attention to (i.e. scanning attention). The influencing variables tested for were size of company, hierarchy, functional roles, age, industry affiliation, and cross-functional experience. The potential relationship between these variables and what managers pay attention to was represented in the theoretical framework in Figure 11. The relevant part of the theoretical framework concerning these potential relationships is recreated in Figure 22 below.

Figure 22: Theoretical framework: Scanning attention and influencing variables.



The initial results will focus on describing the levels of attention paid to fifteen pre-determined types of environmental information. These environmental sectors are listed in Table 32. For each of the fifteen types of information, respondents rated how frequently each type of information came to their attention using a 1 to 7 scale. A rating of 1 was equivalent to “very infrequently (for example, once every 6 months or less)”, and a rating of 7 was equivalent to “very frequently (for example, once every day or more)”. The key statistical results, including means and standard deviations, are presented in Table 28. The results showed that the five types of information most frequently attended to were information about your current company (mean score of 5.76); trends within your company’s industry (mean score of 5.03); functional specialist information (4.91); competitor companies (4.52); and customer companies (4.49).

Whereas the five types of information most infrequently attended to were information about joint venture or alliance partners (3.68); supplier companies (3.65); management techniques (3.63); spending priorities of other companies (2.70); and information about your prior employer company(ies) (2.59).

Table 32: Descriptive statistics of scanning attention.

	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
information about your current company	392	1	7	5.76	1.403	-1.383	.123	1.757	.246
trends within your company's industry	393	1	7	5.03	1.440	-.791	.123	.174	.246
functional specialist information	392	1	7	4.91	1.511	-.474	.123	-.593	.246
competitor companies	392	1	7	4.52	1.570	-.435	.123	-.647	.246
customer companies	386	1	7	4.49	1.842	-.333	.124	-.953	.248
macro level economic information	393	1	7	4.37	1.842	-.410	.123	-.940	.246
regulatory, governmental, and legislative information	394	1	7	4.35	1.661	-.331	.123	-.821	.245
major business leader commentaries	393	1	7	4.20	1.638	-.273	.123	-.715	.246
emerging technologies with potential to impact business	394	1	7	4.16	1.608	-.125	.123	-.772	.245
innovation in a competing product or service	393	1	7	3.96	1.601	-.154	.123	-.978	.246
joint venture or alliance partners	379	1	7	3.68	1.679	.056	.125	-.985	.250
supplier companies	386	1	7	3.65	1.746	.168	.124	-1.006	.248
management techniques	394	1	7	3.63	1.603	.018	.123	-.950	.245
spending priorities of other companies	387	1	7	2.70	1.496	.583	.124	-.648	.247
information about your prior employer company (ies)	367	1	7	2.59	1.590	.658	.127	-.655	.254
Valid N (listwise)	338								

Further analysis was then done to explore for significant differences in attention afforded to these fifteen different types of information, by different sub-groups of managers. Sub-groups of managers were determined based on size of company; hierarchical levels; functional role; age; industry affiliation; predominant scanning mode; and degree of cross-functional experience. An analysis was also done to explore for differences in degrees of information attention across different environmental sectors between MBA and Non-MBA respondents.

Size of company

A one-way ANOVA was run to test whether size of company had a significant effect on the scanning attention paid to the fifteen different types of information. Companies were split into three different levels: level 1 equated to revenue up to £10m; level 2 equated to revenue from £11m to £100m; and level 3 £101m and higher. There was a significant effect of size of company on attention paid to six types of information: management techniques ($F_{(2,376)} = 4.099$, $p = 0.017$); customer companies ($F_{(2,368)} = 3.819$, $p = 0.023$); supplier companies ($F_{(2,368)} = 5.401$, $p = 0.005$); information about your current company ($F_{(2,374)} = 3.450$, $p = 0.033$); regulatory, governmental, and legislative information ($F_{(2,376)} = 3.275$, $p = 0.039$); and competitor companies ($F_{(2,374)} = 3.198$, $p = 0.042$).

A further analysis of the results for each the six significant areas of attention was then run in order to identify which means were significantly different from which other means and the direction of this difference. For each of the six significant areas of attention, the mean attention level by size of company is as presented in Table 33. As

previously defined, level 1 refers to small sized companies (revenues up to £10m), level 2 refers to medium sized companies (revenues from £11m to £100m), and level 3 to large size companies (revenues greater than £100m).

Table 33: Descriptive statistics of attention to six information areas by size of company.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
management techniques	1.00	88	3.94	1.534	.164	3.62	4.27	1	7
	2.00	107	3.80	1.622	.157	3.49	4.11	1	7
	3.00	184	3.41	1.610	.119	3.17	3.64	1	7
	Total	379	3.64	1.609	.083	3.48	3.81	1	7
customer companies	1.00	84	4.86	1.546	.169	4.52	5.19	1	7
	2.00	105	4.74	1.871	.183	4.38	5.10	1	7
	3.00	182	4.28	1.887	.140	4.00	4.56	1	7
	Total	371	4.54	1.825	.095	4.36	4.73	1	7
supplier companies	1.00	85	3.82	1.719	.187	3.45	4.19	1	7
	2.00	104	4.03	1.872	.184	3.66	4.39	1	7
	3.00	182	3.36	1.659	.123	3.12	3.61	1	7
	Total	371	3.65	1.755	.091	3.48	3.83	1	7
information about your current company	1.00	86	5.48	1.813	.196	5.09	5.87	1	7
	2.00	107	5.68	1.412	.136	5.41	5.95	1	7
	3.00	184	5.94	1.151	.085	5.77	6.11	1	7
	Total	377	5.76	1.409	.073	5.62	5.90	1	7
regulatory, governmental, and legislative information	1.00	88	4.13	1.767	.188	3.75	4.50	1	7
	2.00	107	4.68	1.611	.156	4.37	4.99	1	7
	3.00	184	4.26	1.621	.120	4.02	4.49	1	7
	Total	379	4.35	1.663	.085	4.18	4.51	1	7
competitor companies	1.00	88	4.48	1.470	.157	4.17	4.79	1	7
	2.00	106	4.26	1.675	.163	3.94	4.59	1	7
	3.00	183	4.74	1.532	.113	4.51	4.96	1	7
	Total	377	4.54	1.569	.081	4.38	4.70	1	7

For each of the above six areas a test of homogeneity of variances was run. In instances where Levene's $p > 0.05$ equality of variances was assumed and a Tukey post-hoc comparison test was run. Where Levene's $p < 0.05$ equality of variances was not assumed and a Dunnett T3 post-hoc comparison test was run. To recap, these rules determining which type of post-hoc comparison test to run were consistently applied throughout this research.

The significant results of the post-hoc comparison tests were as follows. For the area of management techniques, Levene's $p = 0.491$ and therefore equality of variance was assumed. The significant post-hoc comparison test result was that small companies paid significantly more attention to management techniques information than did large companies ($p = 0.027$). For the area of customer companies, Levene's $p = 0.012$ and therefore equality of variance was not assumed. The significant post-hoc comparison test result was that small companies paid significantly more attention to customer information than did large companies ($p = 0.027$). For the area of supplier companies, Levene's $p = 0.264$ and therefore equality of variance was assumed. The significant post-hoc comparison test result was that mid-sized companies paid significantly more attention to supplier information than did large companies ($p = 0.005$). For the area of information about your current company, Levene's $p < 0.001$ and therefore equality of variance was not assumed. While the large sized companies did pay more attention to information about your current company than did small sized companies, the result of the post-hoc comparison test was not statistically significant ($p = 0.092$). For the area

of regulatory, governmental, and legislative information, Levene's $p = 0.379$ and therefore equality of variance was assumed. The difference whereby medium sized companies paid significantly more attention to regulatory, governmental, and legislative information than did small sized companies was marginally not significant at $p = 0.051$. No other post-hoc comparisons test regarding attention paid to regulatory, governmental, and legislative information were significant. For the area of competitor companies, Levene's $p = 0.098$ and therefore equality of variance was assumed. The significant post-hoc comparison test result was that large sized companies paid significantly more attention to competitor company information than did medium sized companies ($p = 0.035$).

Hierarchical level

A one-way ANOVA was run to test whether level of organisational hierarchy had a significant effect on the scanning attention paid to the fifteen different types of information. Management were split into three different groups: group 1 equated to CEO and MD positions; group 2 equated to positions that were 2 or 3 levels below CEO; and group 3 captured all levels 4 levels and below CEO. There was a significant effect of hierarchical level on attention paid to three types of information: major business leader commentaries ($F_{(2,379)} = 3.154$, $p = 0.044$); management techniques ($F_{(2,380)} = 4.560$, $p = 0.011$); and information about your prior employer company (ies) ($F_{(2,353)} = 3.674$, $p = 0.026$).

A further analysis of the results was then done in order to specifically identify which means were significantly different from which other means and the direction of this difference. For each of the three information areas of major business leader commentaries, management techniques, and information about your prior employer company(ies) the mean attention level by hierarchical level is presented in Table 34 below. As previously defined, group 1 refers to CEO and MD positions; group 2 equated to positions that were 2 or 3 levels below CEO; and group 3 captured all levels 4 levels and below CEO.

Table 34: Descriptive statistics of attention to major business leader commentaries, management techniques, and information about your prior employer company(ies) by hierarchical level.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
major business leader commentaries	1.00	114	4.39	1.622	.152	4.09	4.70	1	7
	2.00	142	4.25	1.616	.136	3.98	4.51	1	7
	3.00	126	3.89	1.621	.144	3.60	4.17	1	7
	Total	382	4.17	1.629	.083	4.01	4.34	1	7
management techniques	1.00	114	3.89	1.510	.141	3.61	4.17	1	7
	2.00	142	3.69	1.576	.132	3.43	3.95	1	7
	3.00	127	3.28	1.680	.149	2.99	3.58	1	7
	Total	383	3.61	1.607	.082	3.45	3.78	1	7
information about your prior employer company (ies)	1.00	109	2.92	1.605	.154	2.61	3.22	1	7
	2.00	133	2.37	1.574	.136	2.10	2.64	1	7
	3.00	114	2.54	1.592	.149	2.24	2.83	1	6
	Total	356	2.59	1.601	.085	2.42	2.76	1	7

The significant results of the post-hoc comparison tests were as follows. For the area of major business leader commentaries, Levene's $p = 0.954$ and therefore equality of variance was assumed. The significant post-hoc comparison test result was that top tier managers (CEO and MDs) pay significantly more attention to major business leader commentaries than lower level managers (level 4 and below) ($p = 0.043$). For management techniques, Levene's $p = 0.161$ and therefore equality of variance was assumed. The significant post-hoc comparison test result was that top tier managers (CEO and MDs) pay significantly more attention to management techniques information than lower level managers (level 4 and below CEO) ($p = 0.010$). For information about your prior employer company (ies), Levene's $p = 0.836$ and therefore equality of variance was assumed. The significant post-hoc comparison test result was that top tier managers (CEO and MDs) pay significantly more attention to prior employer company (ies) information than mid-tier managers (i.e. positions 2 or 3 levels below CEO) ($p = 0.021$).

Functional roles

A one-way ANOVA was run to test whether functional roles had a significant effect on the attention paid to the fifteen different types of information. Functional roles comprised 4 groups: general management, business development, operations, and support. There was a significant effect of functional role on attention paid to two types of information: functional specialist information ($F_{(3,385)} = 8.838$, $p < 0.001$), and customer companies ($F_{(3,379)} = 3.642$, $p = 0.013$).

A further analysis of the results was then done in order to identify which means were significantly different from which other means and the direction of this difference. For the two information areas of interest, the mean attention level by functional area was as per Table 35 below. As previously defined, functional area number 1 equates to general management, 2 to business development, 3 to operations, and 4 to support.

Table 35: Descriptive statistics of attention paid to functional specialist information and customer company information by functional area.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
functional specialist information	1.00	182	4.63	1.574	.117	4.40	4.86	1	7
	2.00	102	4.80	1.463	.145	4.52	5.09	1	7
	3.00	48	5.77	.881	.127	5.52	6.03	4	7
	4.00	57	5.23	1.512	.200	4.83	5.63	2	7
	Total	389	4.90	1.511	.077	4.75	5.05	1	7
customer companies	1.00	181	4.44	1.851	.138	4.17	4.71	1	7
	2.00	102	4.92	1.745	.173	4.58	5.26	1	7
	3.00	46	4.37	1.970	.291	3.78	4.95	1	7
	4.00	54	3.94	1.731	.236	3.47	4.42	1	7
	Total	383	4.49	1.840	.094	4.30	4.67	1	7

The significant results of the post-hoc comparison tests were as follows. For the area of functional specialist information, Levene's $p < 0.001$ and therefore equality of variance was not assumed. The significant post-hoc comparison test results were that managers in general management paid significantly less attention to functional specialist information than did managers in operations ($p < 0.001$) and managers in business

development paid significantly less attention to functional specialist information than did managers in operations ($p < 0.001$). For customer company information, Levene's $p = 0.058$ and therefore equality of variance was assumed. The significant post-hoc comparison test result was that managers in business development paid significantly more attention to customer company information than did managers in support ($p = 0.008$).

Age

A one-way ANOVA was run to test whether age had a significant effect on the attention paid to the fifteen different types of information. Age comprised 4 groups based on quartile statistics. Group 1 included managers born between 30.06.41 and 30.07.61; Group 2 included managers born between 01.08.61 and 28.02.66; Group 3 included managers born between 01.03.66 and 04.01.69; and Group 4 included managers born between 05.01.69 and 16.02.77. There was a significant effect of age on attention paid to two types of information: functional specialist information ($F_{(3,372)} = 3.106$, $p = 0.027$) and spending priority of other companies ($F_{(3,368)} = 3.716$, $p = 0.012$).

A further analysis of the results was then done in order to identify which means were significantly different from which other means and the direction of this difference. For the two information areas of interest, the mean attention level by age was as presented in Table 36 below.

Table 36: Descriptive statistics of attention paid to functional specialist information and spending priorities of other companies by age group.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
functional specialist information	1	94	5.03	1.569	.162	4.71	5.35	1	7
	2	93	5.06	1.451	.150	4.77	5.36	2	7
	3	95	5.01	1.455	.149	4.71	5.31	1	7
	4	94	4.49	1.550	.160	4.17	4.81	1	7
	Total	376	4.90	1.520	.078	4.74	5.05	1	7
spending priorities of other companies	1	93	2.38	1.359	.141	2.10	2.66	1	6
	2	94	2.97	1.562	.161	2.65	3.29	1	7
	3	93	2.94	1.405	.146	2.65	3.22	1	6
	4	92	2.52	1.600	.167	2.19	2.85	1	6
	Total	372	2.70	1.501	.078	2.55	2.85	1	7

The significant results of the post-hoc comparison tests were as follows. For functional specialist information, Levene's $p = 0.570$ and therefore equality of variance was assumed. The significant post-hoc comparison test result was that managers in the age group 2 (i.e. born between 1.08.61 and 28.02.66) paid significantly more attention to functional specialist information than did managers in age group 4 (i.e. born between 5.01.69 and 16.02.77) ($p = 0.046$). For spending priorities of other companies, Levene's $p = 0.181$ and therefore equality of variance was assumed. The significant post-hoc comparison test result was that managers in age group 2 (i.e. born between 1.08.61 and 28.02.66) paid significantly more attention to spending priorities of other companies information than did managers in age group 1 (i.e. born between 30.06.41 and 30.07.61) ($p = 0.034$).

Industry

A one-way ANOVA was run to test whether industry membership had a significant effect on the attention paid to the fifteen different types of information. Four Industry groups were analysed being: Manufacturing (SIC '92 Code D); Transport, Storage, & Communication (SIC '92 Code I); Financial Intermediation (SIC '92 Code J); and Real estate, renting, & business activities (SIC '92 Code K). There was a significant effect of Industry membership on macro level economic information ($F_{(3,322)} = 4.474$, $p = 0.004$); major business leader commentaries ($F_{(3,322)} = 2.713$, $p = 0.045$); management techniques ($F_{(3,323)} = 3.043$, $p = 0.029$); and regulatory, governmental, and legislative information ($F_{(3,323)} = 3.434$, $p = 0.017$).

A further analysis of the results was then done in order to identify which means were significantly different from which other means and the direction of this difference. For the four information areas of interest, the mean attention level by industry was as presented in Table 37 below.

Table 37: Descriptive statistics of attention paid to macro level economic information; major business leader commentaries; management techniques; and regulatory, governmental, and legislative information by major industry group.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
macro level economic information	1.00	82	4.00	1.866	.206	3.59	4.41	1	7
	2.00	32	4.34	1.619	.286	3.76	4.93	1	7
	3.00	89	4.99	1.800	.191	4.61	5.37	1	7
	4.00	123	4.30	1.890	.170	3.96	4.64	1	7
	Total	326	4.42	1.864	.103	4.21	4.62	1	7
major business leader commentaries	1.00	82	3.95	1.602	.177	3.60	4.30	1	7
	2.00	32	4.63	1.561	.276	4.06	5.19	1	7
	3.00	88	4.52	1.748	.186	4.15	4.89	1	7
	4.00	124	4.08	1.580	.142	3.80	4.36	1	7
	Total	326	4.22	1.644	.091	4.04	4.40	1	7
management techniques	1.00	82	3.56	1.548	.171	3.22	3.90	1	7
	2.00	32	3.13	1.431	.253	2.61	3.64	1	6
	3.00	89	3.39	1.482	.157	3.08	3.71	1	7
	4.00	124	3.90	1.679	.151	3.60	4.20	1	7
	Total	327	3.60	1.586	.088	3.43	3.78	1	7
regulatory, governmental, and legislative information	1.00	82	4.04	1.696	.187	3.66	4.41	1	7
	2.00	32	4.69	1.378	.244	4.19	5.18	2	7
	3.00	89	4.61	1.395	.148	4.31	4.90	2	7
	4.00	124	4.02	1.835	.165	3.69	4.34	1	7
	Total	327	4.25	1.666	.092	4.07	4.43	1	7

The significant results of the post-hoc comparison tests were as follows. For macro level economic information, Levene's $p = 0.234$ and therefore equality of variance was assumed. The significant post-hoc comparison test results were that managers in Financial intermediation paid significantly more attention to macro level economic information than managers in Manufacturing ($p = 0.003$); and managers in Financial intermediation paid significantly more attention to macro level economic information than managers in Real estate, renting, & business activities ($p = 0.037$). For the area of major business commentary there were no significant results to report, neither were there for management techniques. For regulatory, governmental, and legislative information, Levene's $p = 0.017$ and therefore equality of variance was not assumed. The significant post-hoc comparison result was that managers in Financial

intermediation paid significantly more attention to regulatory, governmental, and legislative information than managers in Real estate, renting, & business activities ($p = 0.048$).

Cross-functional experience

A one-way ANOVA was run to test whether the degree of cross-functional experience had a significant effect on the attention paid to the fifteen different types of information. Four levels of functional experience were analysed: level 1 represents managers with no past experience in a functional area different to their current functional area; level 2 represents managers who have worked in 1 other different functional area in the past; level 3 represents managers who have worked in 2 or more other different functional areas in the past. There was a significant effect of cross-functional experience on information concerning emerging technologies with potential to impact business ($F_{(2,388)} = 5.128$, $p = 0.006$); information about your prior employer company (ies) ($F_{(2, 361)} = 5.436$, $p = 0.005$); and spending priorities of other companies ($F_{(2,381)} = 3.634$, $p = 0.027$).

A further analysis of the results was then done in order to identify which means were significantly different from which other means and the direction of this difference. For the three information areas of interest, the mean attention level by cross functional experience level was as presented in Table 38 below.

Table 38: Descriptive statistics of attention paid to emerging technologies with potential to impact business; information about your prior employer company(ies); and spending priorities of other companies by cross-functional level of experience.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
emerging technologies with potential to impact business	1.00	203	4.37	1.607	.113	4.15	4.60	1	7
	2.00	97	4.12	1.522	.155	3.82	4.43	1	7
	3.00	91	3.74	1.604	.168	3.40	4.07	1	7
	Total	391	4.16	1.603	.081	4.00	4.32	1	7
information about your prior employer company (ies)	1.00	195	2.82	1.658	.119	2.58	3.05	1	7
	2.00	90	2.24	1.409	.148	1.95	2.54	1	6
	3.00	79	2.32	1.455	.164	1.99	2.64	1	6
	Total	364	2.57	1.576	.083	2.40	2.73	1	7
spending priorities of other companies	1.00	199	2.89	1.569	.111	2.67	3.11	1	7
	2.00	95	2.56	1.327	.136	2.29	2.83	1	6
	3.00	90	2.42	1.445	.152	2.12	2.72	1	6
	Total	384	2.70	1.494	.076	2.55	2.85	1	7

The significant results of the post-hoc comparison tests were as follows. For the area of emerging technologies with potential to impact business, Levene's $p = 0.660$ and therefore equality of variance was assumed. The significant post-hoc comparison result was that managers with no cross functional experience pay significantly more attention to emerging technologies with potential to impact business than do managers with 2 or more functional areas of experience ($p = 0.004$). For information about your prior employer company (ies), Levene's $p = 0.049$ and therefore equality of variance was not assumed. The significant post-hoc comparison results were that managers with no cross functional experience pay significantly more attention to information about prior employer company(ies) than managers who have worked in 1 other functional area ($p = 0.009$); and managers with no cross functional experience pay significantly more

attention to information about prior employer company(ies) than managers with 2 or more functional areas of experience ($p = 0.043$). For spending priorities of other companies, Levene's $p = 0.089$ and therefore equality of variance was assumed. The significant post-hoc comparison result was that managers with no cross functional experience pay significantly more attention to spending priorities of other companies than managers with 2 or more functional areas of experience ($p = 0.036$).

MBA and Non-MBA

A set of independent t-tests were run to test whether MBA status had a significant effect on the attention paid to the fifteen different types of information. There was a significant effect of MBA status on two areas of information: management techniques information ($t = -2.679$, $df = 392$, $p = 0.008$) and information about your current company ($t = -2.800$, $df = 216$, $p = 0.006$). For descriptive statistics of attention paid to these two areas of information refer to the below Table 39.

Table 39: Descriptive statistics of attention paid to management techniques information and information about your current company by MBA status.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
management techniques	MBA graduate	294	3.51	1.608	.094	3.32	3.69	1	7
	Non MBA qualified	100	4.00	1.537	.154	3.69	4.31	1	7
	Total	394	3.63	1.603	.081	3.47	3.79	1	7
information about your current company	MBA graduate	292	5.66	1.466	.086	5.49	5.83	1	7
	Non MBA qualified	100	6.06	1.153	.115	5.83	6.29	1	7
	Total	392	5.76	1.403	.071	5.62	5.90	1	7

For management techniques, Levene's $p = 0.350$ and therefore equality of variance was assumed. The results show that managers with Non-MBA status managers paid significantly more attention to management techniques information than did MBA graduates ($p = 0.008$). For information about your current company, Levene's $p = 0.001$ and therefore equality of variance was not assumed. The results show that Non-MBA status managers paid significantly more attention to information about your current company than did MBA status managers ($p = 0.006$).

Scanning mode

A further analysis was done to test whether the type of scanning mode adopted had a significant effect on the attention paid to the fifteen different types of information. This was of interest to explore whether different levels of formality, reflected in the different types of scanning modes, would be associated with focusing on particular sectors of the environment. Scanning Modes comprised 4 groups: unconditioned viewing, conditioned viewing, informal search, and formal search. There was a significant effect of scanning mode on attention paid to three types of information: joint venture or alliance partners ($F_{(3,363)} = 2.808$, $p = 0.040$); spending priorities of other companies ($F_{(3,372)} = 4.661$, $p = 0.003$); and competitor companies ($F_{(3,376)} = 4.320$, $p = 0.005$).

A further analysis of the results was then done in order to specifically identify which means were significantly different from which other means and the direction of this difference. For the three information areas of interest, the mean attention level by scanning mode was as presented in Table 40 below.

Table 40: Descriptive statistics of attention paid to joint venture or alliance partners, spending priorities of other companies, and competitor companies.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
joint venture or alliance partners	undirected viewing	56	3.43	1.661	.222	2.98	3.87	1	7
	conditioned viewing	114	3.53	1.558	.146	3.24	3.82	1	7
	informal search	92	3.53	1.600	.167	3.20	3.86	1	7
	formal search	105	4.06	1.797	.175	3.71	4.40	1	7
	Total	367	3.66	1.668	.087	3.49	3.84	1	7
spending priorities of other companies	undirected viewing	58	2.59	1.427	.187	2.21	2.96	1	7
	conditioned viewing	116	2.57	1.422	.132	2.31	2.83	1	6
	informal search	94	2.40	1.476	.152	2.10	2.71	1	7
	formal search	108	3.13	1.589	.153	2.83	3.43	1	6
	Total	376	2.69	1.508	.078	2.54	2.84	1	7
competitor companies	undirected viewing	59	4.36	1.606	.209	3.94	4.77	1	7
	conditioned viewing	119	4.25	1.585	.145	3.96	4.54	1	7
	informal search	94	4.44	1.590	.164	4.11	4.76	1	7
	formal search	108	4.95	1.436	.138	4.68	5.23	1	7
	Total	380	4.51	1.569	.080	4.35	4.67	1	7

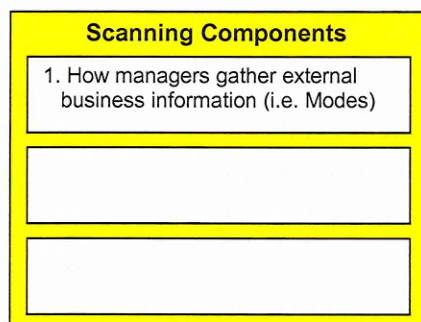
The significant results of the post-hoc comparison tests were as follows. For the area of joint venture or alliance partners: no statistically significant results emerged. For spending priorities of other companies, Levene's $p = 0.309$ and therefore equality of variance was assumed. The significant post-hoc comparison results were that managers who adopt formal search as their predominant scanning mode pay significantly more attention to spending priorities of other companies than do managers who adopt either conditioned viewing ($p = 0.026$) or informal search ($p = 0.003$). For competitor companies, Levene's $p = 0.240$ and therefore equality of variance was assumed. The significant result was that managers who adopt formal search as their predominant scanning mode pay significantly more attention to competitor company information than do managers who adopt conditioned viewing ($p = 0.004$).

6.2.5 Scanning Behaviour Components

As mentioned in Section 4.3, Propositions, the initial basis for identifying how managers gather external business information was for them to report which one of the scanning modes (Aguilar, 1967) reflected their predominant scanning behaviour. The scanning mode typology was useful as a proxy to categorise and differentiate among managers' scanning behaviour. Using this typology also enabled some comparative statistical tests to be done between various independent variables and scanning modes (as undertaken throughout Section 6.2, Proposition Results). However, this approach to assessing scanning behaviour is limited as it relies on a single choice among only four partial descriptions of scanning behaviour. Hence, additional analysis was undertaken to identify some significant underlying dimensions or components of scanning behaviour. The aim of this analysis was to provide some additional understanding into the phenomenon of scanning behaviour and to provide a means to differentiate between such behaviour. The technique used to identify these components was principal components analysis.

In terms of the theoretical framework in Figure 11, this analysis is concerned with developing an alternative means of describing and capturing information concerning how managers gather external business information. The relevant part of the theoretical framework that represents scanning modes is recreated in Figure 23 below.

Figure 23: Theoretical framework: Scanning modes.



Principal components analysis of scanning behaviour items

An exercise was undertaken to examine in more detail the forty four scanning behaviour items, i.e. responses to Q11 and Q12 of the Scanning Behaviour Survey. The first step of this exercise used principal components analysis to explore the structure of the scanning behaviour items on one half of the sample, and then attempted to cross-validate that structure on the other half of the sample.

Analysis of the first half sample:

The first half of the sample comprised 197 cases randomly chosen. Before exploring the structure of scanning behaviour items, two tests were run to determine the suitability of the data for structure detection. The first test was the Kaiser-Meyer-Olkin Measure of Sampling Adequacy which produces a statistic that indicates the proportion of variance in the variables that might be caused by underlying factors. If the value is less than 0.5, the results of the factor analysis may not be very useful. For this first half of the sample, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy statistic was 0.633 which indicated that factor analysis may be useful for structure detection. The second test employed was Bartlett's test of sphericity. This tests the hypothesis that the correlation matrix is an identity matrix, which would indicate that the variables are unrelated and therefore unsuitable for structure detection. This test produced a significant result ($\chi^2 = 2,124.953$, $df = 946$, $p < 0.001$), which further indicated that factor analysis may be useful for structure detection.

An initial solution was then determined using the principal components method of extraction and varimax as the method of rotation of the component matrix. The initial solution identified 15 components that each had eigenvalues greater than 1. These 15 components collectively explained 66.1% of the total variance in the solution. Refer to Table 41 below for further detail on the variance explained by each component.

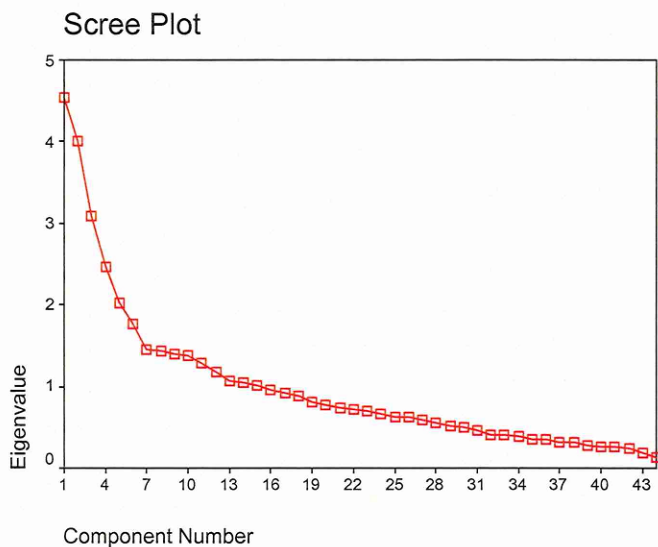
Table 41: Initial solution for the first half sample: Total variance explained.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.537	10.310	10.310	4.537	10.310	10.310	2.971	6.753	6.753
2	4.008	9.110	19.420	4.008	9.110	19.420	2.706	6.150	12.904
3	3.096	7.035	26.456	3.096	7.035	26.456	2.455	5.580	18.483
4	2.455	5.579	32.034	2.455	5.579	32.034	2.216	5.037	23.520
5	2.013	4.576	36.610	2.013	4.576	36.610	1.962	4.459	27.979
6	1.770	4.022	40.633	1.770	4.022	40.633	1.933	4.393	32.372
7	1.449	3.293	43.925	1.449	3.293	43.925	1.879	4.271	36.643
8	1.436	3.263	47.188	1.436	3.263	47.188	1.865	4.239	40.882
9	1.390	3.160	50.348	1.390	3.160	50.348	1.788	4.063	44.945
10	1.376	3.128	53.476	1.376	3.128	53.476	1.729	3.930	48.875
11	1.285	2.920	56.396	1.285	2.920	56.396	1.678	3.814	52.690
12	1.180	2.682	59.078	1.180	2.682	59.078	1.552	3.527	56.217
13	1.063	2.415	61.493	1.063	2.415	61.493	1.549	3.521	59.738
14	1.046	2.377	63.869	1.046	2.377	63.869	1.483	3.370	63.108
15	1.003	2.280	66.149	1.003	2.280	66.149	1.338	3.041	66.149
16	.958	2.177	68.326						
17	.925	2.103	70.429						
18	.876	1.992	72.421						
19	.811	1.844	74.265						
20	.777	1.767	76.032						
21	.739	1.679	77.711						
22	.718	1.632	79.343						
23	.692	1.574	80.917						
24	.660	1.501	82.418						
25	.621	1.412	83.830						
26	.618	1.405	85.235						
27	.590	1.341	86.576						
28	.553	1.257	87.832						
29	.517	1.174	89.006						
30	.502	1.141	90.147						
31	.460	1.046	91.193						
32	.410	.933	92.126						
33	.396	.899	93.025						
34	.390	.886	93.911						
35	.357	.812	94.723						
36	.353	.802	95.525						
37	.320	.728	96.252						
38	.304	.691	96.943						
39	.269	.610	97.554						
40	.258	.587	98.141						
41	.255	.580	98.721						
42	.245	.557	99.278						
43	.183	.415	99.693						
44	.135	.307	100.000						

Extraction Method: Principal Component Analysis.

As per Table 41 above, in the initial solution there were 15 components that had eigenvalues of greater than 1. However, many of the individual components in the initial solution did not greatly contribute to explaining the variance among the variables. For example, each component from 5 through to 15 in the initial solution only individually explained less than 5% of the variance. An analysis of the scree plot also suggested that the number of components in the final solution would likely be much less than 15 and probably no more than 5 or 6. Refer the Figure 24, Initial solution: Scree plot.

Figure 24: Initial solution for the first half sample: Scree plot.



An analysis of the rotated component matrix for the initial solution confirmed the potential to substantially reduce the number of variables to feature in the final solution. There were many instances of variables loading onto two components, variables loading onto multiple components, and single item components. Based on this review, many variables were removed prior to producing a final solution. The variables that were substantially loading on two or more components were removed, as were the single item factors, and variables with loadings less than 0.3 on all or any component were also removed as non-significant.

Once these variables were removed, another solution was computed and the associated scree plot examined. Based on the new scree plot it appeared that a 4 or 5 component solution would emerge. A forced 4 component and a 5 component solution were then computed and analysed. It was decided that the 4 component solution made the most conceptual sense and accounted for a reasonable level of variance. The details of the 4 component solution now follow.

The 4 component final solution for the first half sample comprised 12 variables. For this solution the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.609 and Bartlett's test of sphericity was significant ($\chi^2 = 487.787$, $df = 66$, $p < 0.001$). These test results indicated that for the data underlying these 12 variables, factor analysis may be useful for structure detection.

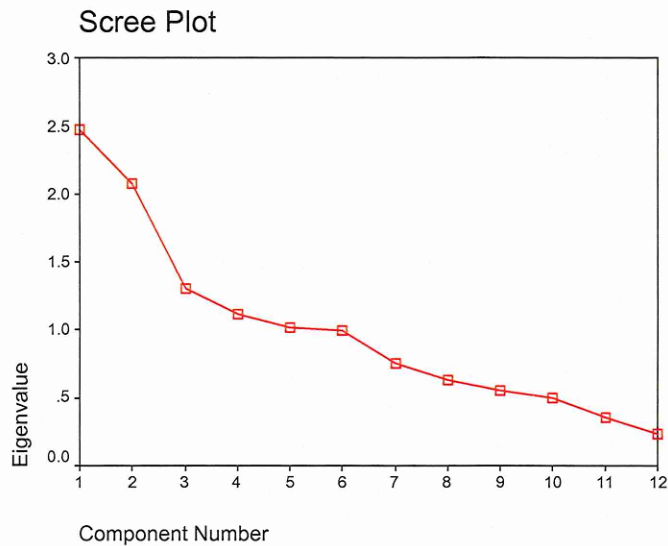
In the final solution for the first half of the sample, the top four components collectively explained 58% of the variance associated with the variables. For details of the components, eigenvalues, and variance explained, refer to the below Table 42. A scree plot follows in Figure 25.

Table 42: Final solution for the first half sample: Total variance explained.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.471	20.592	20.592	2.471	20.592	20.592	2.409	20.072	20.072
2	2.075	17.288	37.880	2.075	17.288	37.880	1.780	14.835	34.907
3	1.301	10.843	48.723	1.301	10.843	48.723	1.495	12.460	47.368
4	1.112	9.263	57.986	1.112	9.263	57.986	1.274	10.618	57.986
5	1.020	8.498	66.484						
6	.995	8.290	74.774						
7	.755	6.295	81.069						
8	.632	5.269	86.338						
9	.557	4.641	90.979						
10	.501	4.173	95.152						
11	.352	2.929	98.081						
12	.230	1.919	100.000						

Extraction Method: Principal Component Analysis.

Figure 25: Final solution for the first half of the sample: Scree Plot.



An analysis of the rotated component matrix was then undertaken to assess the meaning of each of the four components. The specific variables that loaded onto each of the four components, and the strength of loadings post rotation, are presented in the below Table 43.

Table 43: Final solution for first half sample: Rotated component matrix.

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
I would describe my approach to scanning for key information about the environment as very systematic	.849			
I usually have a formal structured plan or process to gather the information I consider I need	.815			
I have a very fine grained screening criteria to discern which information I should pay further attention to	.678			
I am usually very clear on what type of information I am seeking and for what purpose	.675			
I consider information that is communicated informally, versus formally, to be the most valuable		.783		
I consider that information gained through my personal sources, versus public sources, to be the most valuable		.767		
I consider that dialogue, versus one-way-information, is critical to assessing the significance of information		.627		
I often can not find all the strategic information that I want			.815	
I often receive information that is not helpful to me			.759	
I think that it is important to scan broadly over time to be able to recognise important trends through the cumulative effect of processing many items of information				.780
I am motivated to learn all I can about the events and trends in the environment that are strategically relevant to my organisation				.514
I don't consciously scan for information unless I have a particular business purpose in mind				-.413

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Component 1 comprised four variables that collectively imply a high degree of formality and planning with respect to scanning behaviour. Component 1 reflects behaviour that involves stating upfront a set of scanning related purposes, defining the type of information to be sought that would help fulfil the stated purposes, and identifying the means by which the required information will be gathered, analysed, and reported. The label applied to Component 1 is *formality*.

Component 2 concerns the means by which information is gained or communicated. The statements within component 2 reflect that an informal mode of communication is more valuable than a formal mode. The statements also stress the importance of personal sources and dialogue as a preferred means of both gathering information and assessing the significance of that information. The label applied to component 2 to reflect the individualised, verbal, and personalised meaning underlying this component is *personal*.

Component 3 reflects a situation in which the manager is unable to find all of the desired strategy information, and further, may often receive information that is not helpful. The main meaning underlying component 3 is a lack of satisfaction with the type of information acquired. The information acquired may not be sufficiently informative on matters of strategic importance or it may be missing altogether. The label used to describe component 3 is *incompleteness*.

Component 4 comprised three variables that essentially concern the scope or broadness of scanning behaviour. The first variable states the importance of scanning broadly over time to be able to recognise important trends which may result from the cumulative effect of processing many items of information. The second statement also related to scanning broadly through learning all that is possible about the events and trends in the environment that are strategically relevant. The third variable also concerned the scope of scanning efforts. This last variable was negatively loaded onto component four. Hence, its meaning must be re-assessed. Its meaning to component 4 is that it is desirable to embark on a general and broad exploration of information in the outside environment rather than gather information specific to a particular business purpose only. As the common theme of component 4 concerns the broad scope of scanning behaviour, the short form label to describe this component is *breadth*.

Validation of the first half sample:

The components to emerge from the first half sample analysis above were then cross-validated against a second half sample. As for the first half sample, a 4 component solution was computed using the principal components method of extraction and varimax as the method of rotation of the component matrix. The solution produced the same 12 variables that remained in the final solution for the first half sample. For this solution, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy statistic was 0.640 and the Bartlett's test of sphericity produced a significant result ($\chi^2 = 486.662$, $df = 66$, $p < 0.001$). Both of these results confirmed that factor analysis may be useful for structure detection.

The 4 top components collectively explained 61% of variance in the solution. Refer to Table 44 below for further details on the components, eigenvalues, and variance explained. A scree plot follows in Figure 26.

Table 44: Solution for the second half sample: Total variance explained.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.707	22.562	22.562	2.707	22.562	22.562	2.568	21.398	21.398
2	2.119	17.658	40.220	2.119	17.658	40.220	1.892	15.764	37.162
3	1.337	11.146	51.366	1.337	11.146	51.366	1.472	12.268	49.430
4	1.126	9.381	60.746	1.126	9.381	60.746	1.358	11.316	60.746
5	.996	8.299	69.045						
6	.817	6.805	75.850						
7	.716	5.963	81.813						
8	.646	5.381	87.194						
9	.548	4.570	91.764						
10	.440	3.669	95.433						
11	.319	2.656	98.089						
12	.229	1.911	100.000						

Extraction Method: Principal Component Analysis.

Figure 26: Solution for second half of sample: Scree plot.



An analysis of the rotated component matrix was then undertaken to assess the meaning of each of the four components. The specific variables that loaded onto each of the four components, and the strength of loadings post rotation, are presented in the below Table 45.

Table 45: Solution for the second half sample: Rotated component matrix.

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
I would describe my approach to scanning for key information about the environment as very systematic	.849			
I usually have a formal structured plan or process to gather the information I consider I need	.825			
I am usually very clear on what type of information I am seeking and for what purpose	.746			
I have a very fine grained screening criteria to discern which information I should pay further attention to	.671			
I consider that information gained through my personal sources, versus public sources, to be the most valuable		.878		
I consider information that is communicated informally, versus formally, to be the most valuable		.812		
I consider that dialogue, versus one-way-information, is critical to assessing the significance of information		.616		
I often can not find all the strategic information that I want			.840	
I often receive information that is not helpful to me			.813	
I don't consciously scan for information unless I have a particular business purpose in mind				-.674
I am motivated to learn all I can about the events and trends in the environment that are strategically relevant to my organisation				.642
I think that it is important to scan broadly over time to be able to recognise important trends through the cumulative effect of processing many items of information				.625

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

The four variables that load onto component 1 in the second half solution are exactly the same as those that loaded onto the first half solution. The loadings differ across the solutions for each half sample but not significantly. Therefore, the underlying meaning of component 1 for the second half solution is the same as for the first half solution. The label applied to this component is *formality*.

Component 2 for the second half solution is almost identical to component 2 for the first half solution. The three underlying variables are the same for component 2 in both the first and second half samples. The underlying meaning of component 2 in the first half solution and second half solution is the same. The label applied to component 2 was *personal*.

Component 3 for the second half solution is almost identical to component 3 for the first half solution. The only differences are slight differences in the loadings of the variables for the first half solution compared to the second half solution. The label applied to component 2 was *incompleteness*.

The three variables that load onto component 4 in the second half solution are the same as those that loaded onto the first half solution. The loadings differ across the solutions for each half sample but not significantly. Again, the variable concerning business purpose was negatively loaded onto component 4. Hence, its meaning to component 4 is that scanning behaviour is desirable in the absence of a business purpose. Overall, component 4 concerns the broad scope of scanning behaviour. The label to describe this component is *breadth*.

The above results serve to validate the four component solution identified through analysing the first half solution. Based on this cross-validation exercise there appear to be four components that are conceptually clear and contribute to explaining a reasonable amount of variance among the variables in final solution. The next step was to compute and interpret a 4 component solution on the entire sample.

Analysis of the full sample:

A principal components analysis was then conducted on the entire data sample. Based on the prior analysis of the scanning behaviour items in the first half and second half of the sample, it was expected that the four component solution would emerge consistent with the prior identified components labelled *formality*, *personal*, *incompleteness*, and *breadth*.

Prior to conducting a principal components analysis on the entire sample, two tests were run to confirm the suitability of the entire data sample for structure detection. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy statistic was 0.647 and the Bartlett's test of sphericity produced a significance result ($\chi^2 = 872.060$, $df = 66$, $p < 0.001$). Both of these results confirmed that factor analysis may be useful for structure detection.

A four component solution was then computed using the principal components method of extraction and varimax as the method of rotation of the component matrix. The

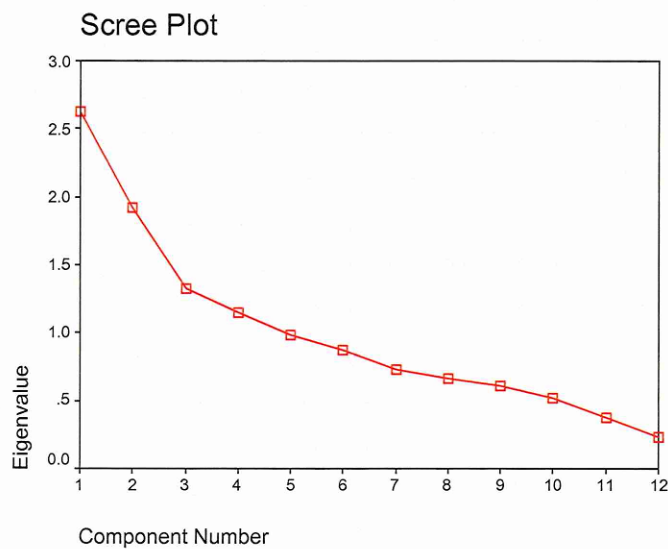
solution produced the same 12 variables that formed part of the first half sample and second half sample solutions. The top 4 components explained 58% of the variance in the solution. Each of top 4 components explain a substantial percentage of variance confirming that the solution is multi-dimensional. Refer to Table 46 below for further details on the components, eigenvalues, and variance explained. A scree plot follows in Figure 27.

Table 46: Solution for the full sample: Total variance explained.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.624	21.864	21.864	2.624	21.864	21.864	2.511	20.925	20.925
2	1.924	16.036	37.900	1.924	16.036	37.900	1.782	14.846	35.771
3	1.322	11.017	48.918	1.322	11.017	48.918	1.421	11.843	47.614
4	1.146	9.547	58.465	1.146	9.547	58.465	1.302	10.851	58.465
5	.986	8.216	66.681						
6	.873	7.278	73.958						
7	.732	6.098	80.056						
8	.664	5.531	85.587						
9	.603	5.025	90.613						
10	.514	4.283	94.895						
11	.376	3.130	98.025						
12	.237	1.975	100.000						

Extraction Method: Principal Component Analysis.

Figure 27: Solution for the full sample: Scree plot.



An analysis of the rotated component matrix was then undertaken to assess the meaning of each of the four components. The specific variables that loaded onto each of the four components, and the strength of loadings post rotation, are presented in the below Table 47.

Table 47: Solution for the full sample: Rotated component matrix.

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
I would describe my approach to scanning for key information about the environment as very systematic	.864			
I usually have a formal structured plan or process to gather the information I consider I need	.839			
I have a very fine grained screening criteria to discern which information I should pay further attention to	.704			
I am usually very clear on what type of information I am seeking and for what purpose	.685			
I consider that information gained through my personal sources, versus public sources, to be the most valuable		.857		
I consider information that is communicated informally, versus formally, to be the most valuable		.845		
I consider that dialogue, versus one-way-information, is critical to assessing the significance of information		.543		
I often can not find all the strategic information that I want			.817	
I often receive information that is not helpful to me			.808	
I am motivated to learn all I can about the events and trends in the environment that are strategically relevant to my organisation				.730
I think that it is important to scan broadly over time to be able to recognise important trends through the cumulative effect of processing many items of information				.642
I don't consciously scan for information unless I have a particular business purpose in mind				-.552

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
 a. Rotation converged in 5 iterations.

The components identified and the loadings almost mirror those identified in the solutions produced based on the first half and second half data. The final four components were also labelled *formality*, *personal*, *incompleteness*, and *breadth*. Based on the commonalities of the computed solution for the first half sample, second half sample, and full sample, it appears as if the components identified are robust. A summary of the final four components and a short form description of their meaning are set out in Table 48 below.

Table 48: Final solution: 4 components.

Components:	Short form description:
1. Formality	A formal and systematic approach to scanning that involves explicitly stating scanning related purposes, defining the type of information sought, and identifying the means by which the required information will be gathered, analysed and reported.
2. Personal	Information is gathered through informal means and personal sources, involving dialogue which is helpful to assessing the significance of information.
3. Incompleteness	Reflects a lack of completeness of desired information that may inform on matters of strategic importance.
4. Breadth	A general and broad exploration for information about events and trends in the business environment to identify items of potential strategic significance.

Scanning behaviour scales:

Based on the components, a set of scanning behaviour scales were determined. For each component, the variables that loaded onto that component in the final solution were identified. The scales were produced by adding up the scores for these variables and dividing by the number of variables. This produced a mean score or scale that could be compared among the different components.

For example, for component 1 the scores by a respondent for the four variables that load onto the *formality* component were added together and divided by four. The interpretation of the resulting statistic is the higher the score the greater the degree of formality with respect to scanning. For component 2, *personal*, the higher the scale score the greater the adoption of a personal approach to scanning. For component 3, *incompleteness*, the higher the scale score the greater the problem of not being able to source of all the desired strategic information. For component 4, the last variable concerning business purpose was transformed to be expressed in the positive and to clarify the meaning of a high score on the component 4 scale. Post transformation, a high score on the component 4 scale, *breadth* is associated with adopting a broad purpose or perspective with respect to scanning.

The means and standard deviations for the 4 scanning behaviour scales are presented in the below Table 49.

Table 49: Scanning behaviour scales: Descriptive statistics.

	N	Minimum	Maximum	Mean	Std. Deviation
SBSCALE1: FORMALITY	386	1.50	7.00	4.1114	1.14141
SBSCALE2: PERSONAL	384	1.00	7.00	4.6623	1.02265
SBSCALE3: INCOMPLETENESS	384	1.00	7.00	5.3711	1.18561
SBSCALE4: BREADTH	382	2.00	7.00	5.0375	.91234
Valid N (listwise)	365				

The *incompleteness* scale has the highest mean of 5.4, followed by *breadth* at 5, *personal* at 4.7, and *formality* at 4. Standard deviations are reasonably comparable across the four scanning behaviour scales.

A set of Cronbach alpha coefficients of reliability were calculated for each of the scanning behaviour scales. The alpha statistics were as follows: *formality* scale 1 = 0.7886, *personal* scale 2 = 0.6329, *incompleteness* scale 3 = 0.5631, and *breadth* = 0.3067. These statistics reflect the lower bound for the true reliability of the survey scales. Underlying these calculations, reliability is defined as the proportion of the variability in the responses to the questions particular to each scale that is the result of differences in the respondents. The computation of Cronbach's alpha is based on the number of items particular to the scanning behaviour scale and the ratio of the average inter-item covariance to the average variance. The alpha statistic for the first scale indicates a reasonable level of reliability at 0.7886. The alpha statistics for the other scales are less reliable than desired; this is particularly true for the survey scale labelled *breadth*. Part of the reason for this may be due to the broad nature of what is being measured. Scanning behaviour is a broad subject which was reflected in the wide array of scanning statements included in the survey. Subsequent refinement of the description of scanning behaviour and related scanning statements may produce a refined set of scanning behaviour scales with stronger Cronbach alpha coefficients of reliability. However, in interpreting Cronbach alpha some further concepts should be kept in mind. First, Cronbach alpha provides an estimate of the internal consistency of the test and thus a) does not indicate the stability or consistency of the test over time which would be better estimated using the test-retest reliability strategy, and b) does not indicate the stability or consistency of the test across test forms which would be better estimated using the equivalent forms reliability strategy. Second, all other factors held constant, Cronbach alpha will be higher for longer tests than for shorter tests and so alpha must be interpreted in light of the particular test length involved. Finally, the criterion for judging the quality of any factor analysis has not been well quantified. Rather, if while scrutinizing the factor analysis, the researcher can understand the final factors then the application is deemed successful (Johnson & Wichern, 1998). In this case, the application may be deemed successful in so far as four interpretable factors were produced.

Further validation of scanning behaviour scales:

Two additional tests were then undertaken to further validate the scanning behaviour scales. The first of these tests was to validate the scanning behaviour scales against the scanning modes. This involved running an ANOVA on each of the scanning scales (i.e. *formality*, *personal*, *incompleteness*, and *breadth*) against each of the four categories of scanning mode (i.e. undirected viewing, conditioned viewing, informal search, and formal search).

An *a priori* expectation was the existence of a significant association between scanning scale 1, *formality*, and the formal search scanning mode. The ANOVA results confirmed that there was a significant effect of scanning mode on scanning scale 1, *formality* ($F_{(3,371)} = 35.042$, $p < 0.001$). Levene's $p = 0.002$ and therefore equality of variance was not assumed. Further, the results confirmed that the *formality* scanning scale score was significantly higher for formal search mode than informal search mode ($p < 0.001$), conditioned viewing ($p < 0.001$), or undirected viewing ($p < 0.001$). As the scanning mode categorisation is based on a single survey item only, substantive conclusions concerning validity cannot be drawn. However, given that the relationship between the *formality* scanning scale and scanning modes is as expected, these results do lend some support to the validity of the newly derived scanning behaviour scales. For details of the scanning behaviour scales scores for each scanning mode, refer to the below Table 50.

Table 50: Scanning behaviour scale scores by scanning mode: Descriptive statistics.

		N	Mean	Std. Deviation	Std. Error
SBSCALE1: FORMALITY	undirected viewing	58	3.8190	1.28827	.16916
	conditioned viewing	119	3.8046	.99424	.09114
	informal search	91	3.6868	.98573	.10333
	formal search	107	4.9486	.87331	.08443
	Total	375	4.1047	1.14121	.05893
SBSCALE2: PERSONAL	undirected viewing	54	4.6667	1.17807	.16031
	conditioned viewing	120	4.5333	1.04198	.09512
	informal search	93	4.7097	1.00148	.10385
	formal search	108	4.7315	.94221	.09066
	Total	375	4.6533	1.02471	.05292
SBSCALE3: INCOMPLETENESS	undirected viewing	58	5.3621	1.12699	.14798
	conditioned viewing	119	5.4580	1.22055	.11189
	informal search	91	5.4890	1.09539	.11483
	formal search	107	5.1869	1.26738	.12252
	Total	375	5.3733	1.19293	.06160
SBSCALE4: BREADTH	undirected viewing	57	5.3509	.82957	.10988
	conditioned viewing	119	5.0672	.91912	.08426
	informal search	92	4.7210	.85489	.08913
	formal search	106	5.1006	.90988	.08837
	Total	374	5.0348	.90721	.04691

A further *a priori* expectation was a significant association between scanning scale 4, *breadth*, and scanning modes. The ANOVA results confirmed this expected significant association ($F_{(3,370)} = 6.486$, $p < 0.001$). Levene's $p = 0.442$ and therefore equality of variance was assumed. The analysis of the specific significant differences among the means showed that the *breadth* scanning scale score was significantly lower for informal search compared to undirected viewing ($p < 0.001$), conditioned viewing ($p = 0.027$), and formal search ($p = 0.015$). This result is consistent with the definitions of the *breadth* scanning scale and scanning modes. Scanning behaviour scale means for each scanning mode are shown in the above Table 50. The short form definition of the *breadth* scanning scale was "a general and broad exploration for information about events and trends in the business environment to identify items of potential strategic significance." Scanning modes of undirected and conditioned viewing are broad in scope as they involve "general exposure to information" and "directed exposure" respectively. The formal mode of scanning is also expected to be broad in scope resulting from an explicit plan to gather information across a wide range of sectors. Hence, the result that informal search mode (i.e. "a relatively limited and unstructured effort to obtain specific information or information for a specific purpose") is relatively less broad in scope than other modes is consistent with expectations. As above, the result lends some additional validity to the newly derived scanning scales. No further significant ANOVA results emerged between the other scanning behaviour scale scores labelled *personal* and *incompleteness*, and scanning modes.

The second test performed to validate the newly derived scanning scales was to analyse the correlation between the scanning scales and the dimension of specificity of information. The specificity dimension was reflected in the statement "I usually seek out clearly identified types of information". An *a priori* expectation was that there would be a significant correlation between the specificity dimension (reflected in the above statement) and the *formality* scanning scale. This result did in fact emerge ($r = 0.488$, $n = 385$, $p < 0.001$) lending further support to the validity of the new scanning scales.

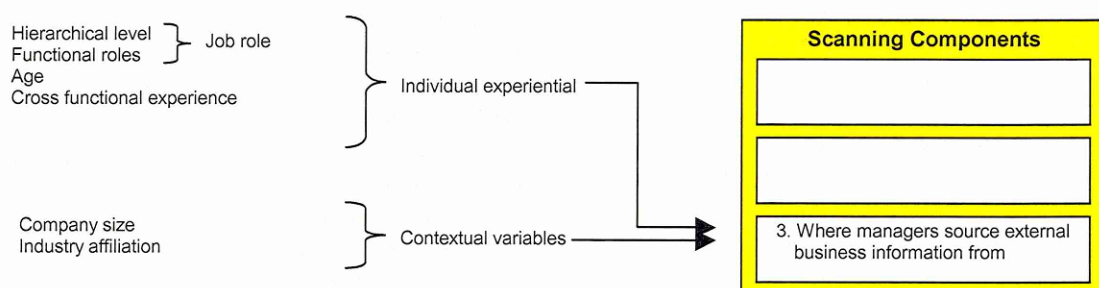
There was only one other significant correlation to emerge between the scanning scales and the dimension of specificity of information. The specificity dimension was significantly correlated with scanning behaviour scale 2, *personal* ($r = 0.103$, $n = 383$, $p = 0.044$). This may reflect that clarity of information types sought is associated with greater activity in gathering such information, whereby one of the means of gathering information is *personal* (i.e. gathered through informal means and personal sources, involving dialogue which is helpful in assessing the significance of information). It is worth noting that the strength of correlation is not particularly strong. Further, this result was not predicted *a priori*. Nonetheless, it is not inconsistent with the definitions of the variables concerned and does not detract from the validity of the newly derived scanning scales.

6.2.6 Technology Influence

A further area of exploratory analysis concerned the frequency of use of technology as a medium for scanning. The related tests examined the effect of various influencing variables on where managers source external business information from (i.e. scanning

sources). The influencing variables tested for were size of company, hierarchy, functional roles, age, industry affiliation, and cross-functional experience. The potential relationship between these variables and scanning sources was represented in the theoretical framework in Figure 11. The relevant part of the theoretical framework concerning these potential relationships is recreated in Figure 28 below.

Figure 28: Theoretical framework: Scanning sources and influencing variables.



In the Scanning survey, four questions were asked regarding the frequency of usage of four sources of information. The four sources were: 1) Personal networks of individuals outside your company, 2) Internet sources including search engines, company websites, email information subscription services, 3) Traditional mediums such as television, radio, newspaper, business magazines etc., and 4) Company personnel such as superiors, peers, and subordinates.

Respondents were asked to indicate how often they used each of the above four sources of information to find out about events outside their organisation. For each source, they indicated the frequency using the one (1) to seven (7) scale. A score of 1 meant that the source was used very infrequently, for example, once every six months or less. A score of 4 implied a frequency of once every couple of months or so. A score of 7 indicated that the source was used very frequently, for example, once every day or more.

An analysis of the descriptive statistics shows that overall the most frequently referenced sources were internet sources including search engines, company websites, and email information subscription services (mean score of 5.77). The next most frequently referenced sources in order were company personnel such as superiors, peers, subordinates (mean of 5.47); traditional mediums such as television, radio, newspaper, business magazines etc. (mean of 5.40); and personal networks of individuals outside the company (mean of 4.66). Refer to below Table 51 for additional descriptive statistics for each major source.

Table 51: Descriptive statistics for frequency of reference to four major information sources.

	N	Minimum	Maximum	Mean	Std.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Internet sources including search engines, company websites, email information subscription services	386	1	7	5.77	1.254	-1.158	.124	1.306	.248
Company personnel such as superiors, peers, subordinates	383	0	7	5.47	1.197	-1.113	.125	2.062	.249
Traditional mediums such as television, radio, newspaper, business magazines etc.	386	1	7	5.40	1.292	-.792	.124	.276	.248
Personal networks of individuals outside your company	385	1	7	4.66	1.526	-.517	.124	-.498	.248
Valid N (listwise)	382								

Some further tests were then run to discern if there were any major differences in the frequency of use among these four sources of information for different groupings of managers. The different grouping of managers were organised by size of company, hierarchical level, scanning mode, functional roles, age, industry, cross-functional experience, and MBA versus non-MBA.

Initial one-way ANOVA results showed that there was no significant effect on the frequency of information sourced from the major sources resulting from functional roles, age, or cross-functional experience. Other significant results did occur as follows.

Size of company

A one-way ANOVA was run to test whether size of company had a significant effect on the frequency of use of each of the four sources of information. Companies were split into three different levels: level 1 equated to revenue up to £10m; level 2 equated to revenue from £11m to £100m; and level 3 £101m and higher. For details of the descriptive statistics showing the mean scores of frequency of use of sources by size of company refer to the below Table 52.

Table 52: Descriptive statistics: Sources of information by size of company.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal networks of individuals outside your company	1.00	85	4.88	1.392	.151	4.58	5.18	1	7
	2.00	105	4.56	1.605	.157	4.25	4.87	1	7
	3.00	181	4.66	1.533	.114	4.43	4.88	1	7
	Total	371	4.68	1.523	.079	4.53	4.84	1	7
Internet sources including search engines, company websites, email information subscription services	1.00	85	5.75	1.262	.137	5.48	6.03	2	7
	2.00	105	5.67	1.459	.142	5.38	5.95	1	7
	3.00	182	5.84	1.130	.084	5.67	6.00	2	7
	Total	372	5.77	1.259	.065	5.64	5.90	1	7
Traditional mediums such as television, radio, newspaper, business magazines etc.	1.00	85	5.22	1.366	.148	4.93	5.52	2	7
	2.00	105	5.39	1.438	.140	5.11	5.67	1	7
	3.00	182	5.49	1.179	.087	5.32	5.67	2	7
	Total	372	5.40	1.301	.067	5.27	5.54	1	7
Company personnel such as superiors, peers, subordinates	1.00	83	5.14	1.432	.157	4.83	5.46	0	7
	2.00	105	5.59	1.115	.109	5.37	5.81	3	7
	3.00	181	5.57	1.096	.081	5.41	5.74	1	7
	Total	369	5.48	1.196	.062	5.36	5.60	0	7

The results of the ANOVA tests identified a significant effect of size of company on the frequency of information sourced from company personnel such as superiors, peers, and subordinates ($F_{(2,366)} = 4.358, p = 0.013$).

The significant results of the post-hoc comparison tests were as follows. Levene’s $p = 0.101$ and therefore equality of variance was assumed. For the area of company personnel such as superiors, peers, and subordinates: that managers in small sized companies sourced information from company personnel such as superiors, peers, and subordinates much less frequently than managers in medium sized companies ($p = 0.029$); and managers in small sized companies sourced information from company personnel such as superiors, peers, and subordinates much less frequently than managers in large sized companies ($p = 0.018$).

Hierarchical level

A one-way ANOVA was run to test whether level of organisational hierarchy had a significant effect on the frequency of use of each of the four sources of information. Management were split into three different groups: group 1 equated to CEO and MD positions; group 2 equated to positions that were 2 or 3 levels below CEO; and group 3 captured all levels 4 levels and below CEO. For details of the descriptive statistics showing the mean scores of frequency of use of sources by hierarchical level refer to the below Table 53.

Table 53: Descriptive statistics: Sources of information by hierarchical level.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal networks of individuals outside your company	1.00	110	4.86	1.443	.138	4.59	5.14	1	7
	2.00	141	4.66	1.438	.121	4.42	4.90	1	7
	3.00	124	4.47	1.660	.149	4.17	4.76	1	7
	Total	375	4.66	1.520	.079	4.50	4.81	1	7
Internet sources including search engines, company websites, email information subscription services	1.00	110	5.49	1.464	.140	5.21	5.77	1	7
	2.00	141	5.82	1.104	.093	5.64	6.01	3	7
	3.00	125	5.94	1.207	.108	5.73	6.16	2	7
	Total	376	5.77	1.262	.065	5.64	5.89	1	7
Traditional mediums such as television, radio, newspaper, business magazines etc.	1.00	110	5.35	1.424	.136	5.08	5.61	1	7
	2.00	141	5.30	1.236	.104	5.10	5.51	2	7
	3.00	125	5.54	1.248	.112	5.32	5.76	1	7
	Total	376	5.40	1.298	.067	5.26	5.53	1	7
Company personnel such as superiors, peers, subordinates	1.00	108	5.41	1.283	.123	5.16	5.65	1	7
	2.00	141	5.50	1.193	.100	5.30	5.70	0	7
	3.00	124	5.51	1.158	.104	5.30	5.71	1	7
	Total	373	5.48	1.206	.062	5.35	5.60	0	7

The results of the ANOVA tests identified a significant effect of hierarchical level on the frequency of information sourced from internet sources including search engines, company websites, and email information subscription services ($F_{(2,373)} = 4.063$, $p = 0.018$).

The significant results of the post-hoc comparison tests were as follows. Levene's $p = 0.015$ and therefore equality of variance was not assumed. For the area of internet sources: managers in group 1, i.e. CEOs and MDs, used the internet sources significantly less than managers in group 3, i.e. 4 or more levels below CEO level ($p = 0.032$).

Scanning mode

A one-way ANOVA was run to test whether the type of scanning mode adopted had a significant effect on the frequency of use of each of the four sources of information. Scanning Modes comprised 4 groups: unconditioned viewing, conditioned viewing, informal search, and formal search. For details of the descriptive statistics showing the mean scores of frequency of use of sources by scanning mode refer to the below Table 54.

Table 54: Descriptive statistics: Sources of information by scanning mode.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal networks of individuals outside your company	undirected viewing	59	4.56	1.643	.214	4.13	4.99	1	7
	conditioned viewing	119	4.59	1.492	.137	4.32	4.86	1	7
	informal search	94	4.68	1.446	.149	4.38	4.98	1	7
	formal search	107	4.76	1.565	.151	4.46	5.06	1	7
	Total	379	4.65	1.522	.078	4.50	4.81	1	7
Internet sources including search engines, company websites, email information subscription services	undirected viewing	59	5.47	1.331	.173	5.13	5.82	2	7
	conditioned viewing	120	5.61	1.190	.109	5.39	5.82	2	7
	informal search	94	5.99	1.083	.112	5.77	6.21	3	7
	formal search	107	5.96	1.352	.131	5.70	6.22	1	7
	Total	380	5.78	1.249	.064	5.66	5.91	1	7
Traditional mediums such as television, radio, newspaper, business magazines etc.	undirected viewing	59	5.73	1.284	.167	5.39	6.06	2	7
	conditioned viewing	120	5.27	1.346	.123	5.02	5.51	1	7
	informal search	94	5.32	1.246	.129	5.06	5.57	2	7
	formal search	107	5.47	1.254	.121	5.23	5.71	1	7
	Total	380	5.41	1.291	.066	5.28	5.54	1	7
Company personnel such as superiors, peers, subordinates	undirected viewing	58	5.53	1.301	.171	5.19	5.88	1	7
	conditioned viewing	120	5.38	1.138	.104	5.17	5.58	1	7
	informal search	94	5.43	1.102	.114	5.20	5.65	2	7
	formal search	105	5.62	1.304	.127	5.37	5.87	0	7
	Total	377	5.48	1.203	.062	5.36	5.60	0	7

The results of the ANOVA test identified a significant effect of scanning mode on the frequency of information sourced from internet sources ($F_{(3,376)} = 3.652, p = 0.013$). However, the post-hoc comparison tests did not identify any significant differences between means.

Industry

A one-way ANOVA was run to test whether industry membership had a significant effect on the frequency of use of each of the four sources of information. Four Industry groups were analysed being: Manufacturing (SIC '92 Code D); Transport, Storage, & Communication (SIC '92 Code I); Financial Intermediation (SIC '92 Code J); and Real estate, renting, & business activities (SIC '92 Code K). For details of the descriptive statistics showing the mean scores of frequency of use of sources by industry affiliation refer to the below Table 55.

Table 55: Descriptive statistics: Sources of information by industry.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal networks of individuals outside your company	1.00	81	4.49	1.534	.170	4.15	4.83	2	7
	2.00	32	4.63	1.431	.253	4.11	5.14	2	7
	3.00	87	4.72	1.654	.177	4.37	5.08	1	7
	4.00	120	4.74	1.509	.138	4.47	5.01	1	7
	Total	320	4.66	1.545	.086	4.49	4.83	1	7
Internet sources including search engines, company websites, email information subscription services	1.00	81	5.53	1.458	.162	5.21	5.85	1	7
	2.00	32	6.09	.995	.176	5.73	6.45	4	7
	3.00	88	5.67	1.152	.123	5.43	5.91	2	7
	4.00	120	6.03	1.137	.104	5.83	6.24	2	7
	Total	321	5.81	1.233	.069	5.68	5.95	1	7
Traditional mediums such as television, radio, newspaper, business magazines etc.	1.00	81	5.31	1.348	.150	5.01	5.61	1	7
	2.00	32	5.44	1.216	.215	5.00	5.88	3	7
	3.00	88	5.57	1.346	.143	5.28	5.85	2	7
	4.00	120	5.39	1.232	.112	5.17	5.61	1	7
	Total	321	5.42	1.290	.072	5.28	5.57	1	7
Company personnel such as superiors, peers, subordinates	1.00	81	5.38	1.179	.131	5.12	5.64	1	7
	2.00	31	5.71	.938	.168	5.37	6.05	4	7
	3.00	88	5.35	1.455	.155	5.04	5.66	0	7
	4.00	118	5.45	1.181	.109	5.23	5.66	2	7
	Total	318	5.43	1.241	.070	5.29	5.57	0	7

The results of the ANOVA identified that there was a significant effort of Industry membership on the frequency of information sourced from internet sources ($F_{(3,317)} = 3.727$, $p = 0.012$). However, the post-hoc comparison tests did not identify any significant differences between means.

MBA and Non-MBA

A set of independent t-tests were run to test whether MBA status had a significant effect on the frequency of use of each of the four major sources of information. Levene's $p = 0.177$ and therefore equality of variance was assumed. There was a significant effort of MBA status on the frequency of information sourced from internet sources including search engines, company websites, and email information subscription services ($t = 2.490$, $df = 384$, $p = 0.013$). For descriptive statistics showing the mean scores of frequency of use of sources by MBA status refer to the below Table 56.

Table 56. Descriptive statistics: sources of information by MBA status.

Internet sources including search engines, company websites, email information subscription services								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
MBA graduate	286	5.86	1.209	.071	5.72	6.00	1	7
Non MBA qualified	100	5.50	1.345	.134	5.23	5.77	1	7
Total	386	5.77	1.254	.064	5.64	5.89	1	7

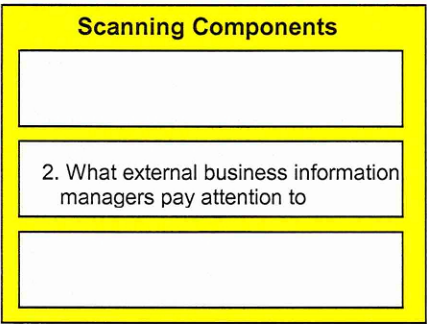
The results show that managers with MBA status managers used internet sources significantly more than did Non-MBA status managers ($p = 0.013$).

6.2.7 Scanning Attention Components

Additional analysis was undertaken to identify some significant underlying dimensions or components of scanning attention. The aim of this additional analysis was to provide further understanding into the phenomenon of scanning behaviour and to provide a means to differentiate between such behaviour. The technique used to identify these components was principal components analysis.

In terms of the theoretical framework in Figure 11, this analysis is concerned with developing an alternative means of describing and capturing information concerning what external business information managers pay attention to. The relevant part of the theoretical framework that represents scanning attention is recreated in Figure 29 below.

Figure 29: Theoretical framework: Scanning attention.



Principal components analysis of scanning attention items

A principal components analysis of the fifteen scanning attention items (i.e. responses to Q8 of the Scanning Behaviour Survey) was undertaken. An analysis was undertaken to explore the structure of the scanning attention items on one half of the sample, and then an attempt was made to cross-validate that structure on the other half of the sample.

Analysis of the first half sample:

The first half of the sample comprised 197 cases randomly chosen. For the fifteen scanning attention variables, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy statistic was 0.812 and the Bartlett’s test of sphericity produced a significance result ($\chi^2 = 601.534$, $df = 105$, $p < 0.001$). Both of these results confirmed that factor analysis may be useful for structure detection.

An initial solution was then determined using the principal components method of extraction and varimax as the method of rotation of the component matrix. The initial solution identified 4 components that each had eigenvalues greater than 1. These 4 components collectively explained 56% of the total variance in the solution. Refer to Table 57 below for further details on the variance explained by each component.

Table 57: Initial solution for the first half sample: Total variance explained.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.528	30.189	30.189	4.528	30.189	30.189	2.243	14.955	14.955
2	1.431	9.538	39.727	1.431	9.538	39.727	2.121	14.138	29.093
3	1.267	8.448	48.176	1.267	8.448	48.176	2.010	13.397	42.490
4	1.113	7.417	55.593	1.113	7.417	55.593	1.965	13.103	55.593
5	.966	6.439	62.033						
6	.922	6.147	68.179						
7	.722	4.814	72.993						
8	.705	4.698	77.691						
9	.651	4.339	82.030						
10	.592	3.949	85.979						
11	.518	3.456	89.435						
12	.467	3.112	92.548						
13	.422	2.816	95.363						
14	.362	2.413	97.776						
15	.334	2.224	100.000						

Extraction Method: Principal Component Analysis.

An analysis of the rotated component matrix for the initial solution resulted in the identification of some variables to remove. These variables were significantly loading onto two components, significantly loading across multiple components, or were single item components. Hence, the following scanning attention variables were removed: major business leader commentaries; spending priorities of other companies; information about your current company; innovation in a competing product or service; information about your prior employer company (ies); and regulatory, governmental, and legislative information.

Following the removal of these variables, another solution was computed and the rotated component matrix and associated scree plot was examined. Based on the new scree plot it appeared that a 3 or 4 component solution would emerge. A forced 3 component and 4 component solution were computed and analysed. The analysis suggested that the 3 component solution made the most conceptual sense and accounted for a reasonable level of variance. Further, the variance accounted for by each of the 3 components was substantive at 20%, 20%, and 18% respectively. Further details of the 3 component solution now follow.

The 3 component solution for the first half sample comprised nine variables. For this solution the Kaiser-Myer-Olkin Measure of Sampling Adequacy was 0.730 and Bartlett’s test of sphericity produced a significant result ($\chi^2 = 264.334$, $df = 36$, $p < 0.001$). These test results indicated that for this data, factor analysis may be useful for structure detection.

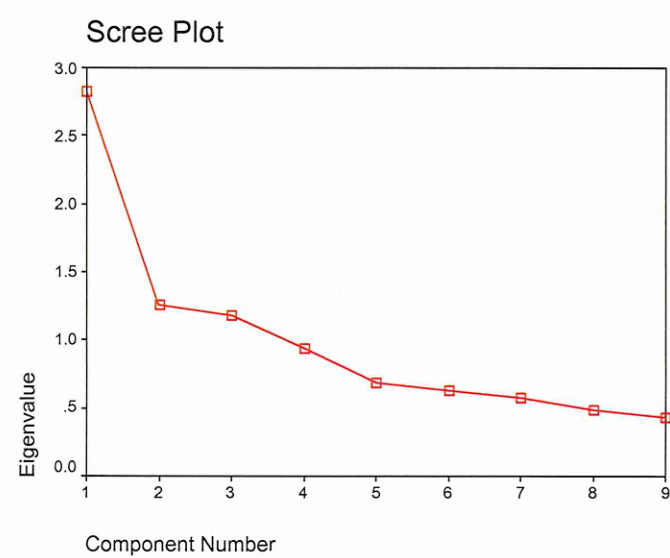
In the final solution for the first half of the sample, the top 3 components collectively explained 58% of the variance associated with the variables. For details of the components, eigenvalues, and variance explained, refer to the below Table 58. A scree plot follows in Figure 30.

Table 58: Final solution for the first half sample: Total variance explained.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.823	31.363	31.363	2.823	31.363	31.363	1.808	20.093	20.093
2	1.259	13.986	45.349	1.259	13.986	45.349	1.791	19.900	39.993
3	1.185	13.163	58.512	1.185	13.163	58.512	1.667	18.519	58.512
4	.933	10.367	68.880						
5	.688	7.644	76.524						
6	.626	6.961	83.484						
7	.572	6.353	89.837						
8	.482	5.356	95.194						
9	.433	4.806	100.000						

Extraction Method: Principal Component Analysis.

Figure 30: Final solution for the first half sample: Scree plot.



An analysis of the rotated component matrix was then undertaken to assess the meaning of each of the 3 components. The specific variables that loaded onto each of the 3 components, and the strength of loadings post rotation, are presented in the below Table 59.

Table 59: Final solution for the first half sample: Rotated component matrix.

Rotated Component Matrix ^a			
	Component		
	1	2	3
trends within your company's industry	.837		
competitor companies	.695		
macro level economic information	.649		
supplier companies		.791	
customer companies		.737	
joint venture or alliance partners		.712	
management techniques			.775
emerging technologies with potential to impact business			.714
functional specialist information			.678

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Component 1 comprised three variables that each concern the market in which a firm operates. The variables concern trends specific to a firm's industry, competitor company information which collectively portrays the major events within an industry, and higher level economic information. All of these variables concern external market events and trends that are likely to impact at the firm level. The label given to the first scanning attention component is *market*.

Component 2 comprised the three variables of suppliers, customers, and joint venture or alliance partners. All of these variables describe potentially important entities for a firm in terms of the core process of sourcing resources, converting resources into final products or services, and selling through to an end customer base. These entities of suppliers and customers in particular, may be represented as key external members in a firm's value chain. There is logic to paying attention to those entities that are closely related to the regular operational activities of a firm. The above principal component analysis suggests that a high degree of attention to suppliers is significantly correlated with a high degree of attention to customer information. This may reflect the integrated view of procurement through to sales that managers adopt. A view consistent with training on the merits of adopting a value chain management or supply chain management perspective. The short form label given to this second attention component is *chain*.

Three variables had significant loadings onto Component 3. These variables were management techniques, emerging technologies with potential to impact business, and functional specialist information. These variables may be interpreted as all reflecting a degree of technical or specialist knowledge particular to business. The label given to component 3 was *specialist*.

Validation of the first half sample:

The components to emerge from the first half sample analysis were then cross-referenced against a second half sample. For the second half sample, two tests were run to determine the suitability of the data for structure detection. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy statistic was 0.736 and the Bartlett’s test of sphericity produced a significant result ($\chi^2 = 300.797$, $df = 36$, $p < 0.001$). Both of these results confirmed that factor analysis may be useful for structure detection.

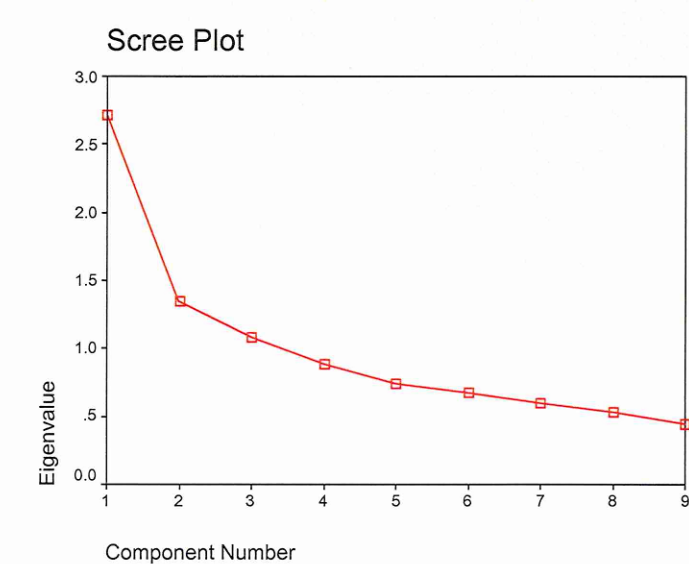
As for the first half solution, a 3 component solution was computed using the principal components method of extraction and varimax as the method of rotation of the component matrix. The solution applied to the 9 variables that comprised the final solution for the first half sample. The top 3 components collectively explained 57% of variance in the solution. Refer to Table 60 below for further details on the components, eigenvalues, and variance explained. A scree plot follows in Figure 31.

Table 60: Solution for the second half sample: Total variance explained.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.712	30.132	30.132	2.712	30.132	30.132	1.805	20.060	20.060
2	1.349	14.984	45.116	1.349	14.984	45.116	1.766	19.625	39.684
3	1.086	12.070	57.186	1.086	12.070	57.186	1.575	17.501	57.186
4	.881	9.786	66.972						
5	.735	8.167	75.138						
6	.670	7.444	82.583						
7	.591	6.572	89.155						
8	.531	5.897	95.052						
9	.445	4.948	100.000						

Extraction Method: Principal Component Analysis.

Figure 31: Solution for the second half of the sample: Scree plot.



An analysis of the rotated component matrix was then undertaken to assess the meaning of each of the 3 components. The specific variables that loaded onto each of the three components, and the strength of loadings post rotation, are presented in the below Table 61.

Table 61: Solution for the second half sample: Rotated component matrix.

Rotated Component Matrix ^a			
	Component		
	1	2	3
trends within your company's industry	.777		
competitor companies	.685		
macro level economic information	.617		
supplier companies		.788	
joint venture or alliance partners		.780	
customer companies		.540	
management techniques			.793
functional specialist information			.720
emerging technologies with potential to impact business			.531

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

The variables that load onto each of the three components in the solution for the second half sample are exactly the same as those that loaded onto the first half sample. The loadings differ across the solutions for each half sample but not significantly. Therefore the underlying meaning for each of the three components for the second half solutions is the same as for the first half solution. Appropriate labels for each of the 3 components remain as *market*, *chain*, and *specialist*.

These results serve to validate the 3 component solution identified in the first half analysis. Based on this cross-validation there appear to be 3 components that are conceptually clear and contribute to explaining a reasonable amount of variance among the variables in the final solution. The next step was to compute and interpret a 3 component solution on the full sample.

Analysis of the full sample:

A principal components analysis was then conducted on the full data sample. Based on the prior principal components analysis of the scanning attention items in the first and second half of the sample, it was expected that a 3 component solution would emerge consistent with the prior identified components labelled *market*, *chain*, and *specialist*.

Prior to conducting a principal components analysis on the full sample, two tests were run to confirm the suitability of the full sample for structure detection. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy statistic was 0.752 and the Bartlett’s test of sphericity produced a significant result ($\chi^2 = 553.712$, $df = 36$, $p < 0.001$). Both of these results confirmed that factor analysis may be useful for structure detection.

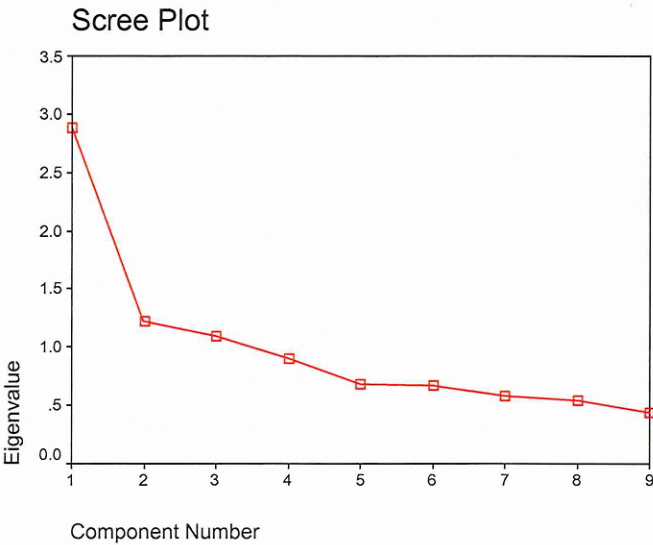
A 3 component solution was then computed using the principal components method of extraction and varimax as the method of rotation of the component matrix. The solution applied to the 9 variables that formed part of the first half sample and second half sample solutions. The top three components explained 58% of the variance in the solution. Refer to Table 62 below for further details on the components, eigenvalues, and variance explained. A scree plot follows in Figure 32.

Table 62: Solution for the full sample: Total variance explained.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.879	31.989	31.989	2.879	31.989	31.989	1.747	19.408	19.408
2	1.217	13.518	45.506	1.217	13.518	45.506	1.724	19.160	38.568
3	1.096	12.183	57.690	1.096	12.183	57.690	1.721	19.122	57.690
4	.896	9.955	67.644						
5	.687	7.638	75.282						
6	.668	7.424	82.706						
7	.576	6.405	89.111						
8	.546	6.068	95.179						
9	.434	4.821	100.000						

Extraction Method: Principal Component Analysis.

Figure 32: Solution for the full sample: Scree plot.



An analysis of the rotated component matrix was then undertaken to assess the meaning of each of the 3 components. The specific variables that loaded onto each of the 3 components, and the strength of loadings post rotation, are presented in Table 63.

Table 63: Solution for the full sample: Rotated component matrix.

	Component		
	1	2	3
trends within your company's industry	.770		
macro level economic information	.717		
competitor companies	.608		
supplier companies		.760	
joint venture or alliance partners		.727	
customer companies		.642	
management techniques			.752
functional specialist information			.715
emerging technologies with potential to impact business			.672

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

The components identified and loadings are very similar to both the first half and second half sample solutions. Therefore, based on the commonalities of the solution for the first half sample, second half sample, and full sample, it appears as if the components identified are reasonably robust. A summary of the final 3 components and a short description of their meaning is provided in Table 64 below.

Table 64: Final solution: 3 components.

Components:	Short form description:
1. Market	Information concerning events and trends within a firm's industry including competitor intelligence, and broad economic indicators.
2. Chain	Information particular to outside entities with close links to a firm's operations on the supply side (suppliers) or demand side (customers).
3. Specialist	Information of a specialist or technical nature which may include management techniques, emerging technologies, and functional specific information.

Scanning attention scales:

Based on the three scanning attention components, a set of 3 scanning attention scales were determined. Each scale was produced by adding up the appropriate variables (i.e. the variables associated with a particular component) and dividing by the number of variables. This produced a mean score or scale that could be compared among the different scanning attention scales.

For example, for component 1 labelled *market*, the scores by a respondent for the three variables that load onto the *market* component were added together and divided by three. The interpretation of the resulting statistic is the higher the score the greater the degree of attention to *market* information. For component 2 labelled *chain*, the higher the score the greater the degree of attention afforded to *chain* related information (i.e. suppliers and customers). Finally, for component 3 labelled *specialist*, the higher score the greater the degree of attention paid to specialist and technical information of a business nature.

The means and standard deviations for the 3 scanning attention scales are presented in the below Table 65.

Table 65: Scanning attention scales: Descriptive statistics.

	N	Minimum	Maximum	Mean	Std. Deviation
ATTSC1: MARKET	390	1.33	7.00	4.6436	1.20329
ATTSC2: CHAIN	369	1.00	7.00	3.9268	1.31224
ATTSC3: SPECIALIST	392	1.00	6.67	4.2347	1.16909
Valid N (listwise)	366				

The *market* scale has the highest average mean of 4.6, followed by *specialist* at 4.2, and *chain* at 3.9. Standard deviations are reasonably comparable across the three components.

A set of Cronbach alpha coefficients of reliability were calculated for each of scanning attention scales. The alpha statistics were as follows: *market* = 0.58, *chain* = 0.60, and *specialist* = 0.59. These statistics reflect the lower bound for the true reliability of the scanning attention scales. These alpha statistics are not at the desired level of 0.7 and above. This may in part be due to there only being three items underlying each scanning attention scale. In future research efforts, it may be possible to elaborate on the three identified attention concepts (i.e. *market*, *chain*, and *specialist*) and include more items in a survey that reflect these concepts. This may result in a more robust set of scanning attention scales, with accordingly higher Cronbach alpha coefficients of reliability.

Further validation of scanning attention scales:

Two further tests were undertaken to validate the scanning attention scales. The first test was to validate the scales against the scanning modes. This involved running an ANOVA of each of the scanning attention scales (i.e. *market*, *chain*, and *specialist*) against each of the four categories of scanning mode (i.e. undirected viewing, conditioned viewing, informal search, and formal search).

An *a priori* expectation was that there would be a significant effect of scanning mode on scanning attention scale one, *market*. The ANOVA result confirmed that there was such a significant effect ($F_{(3,374)} = 4.364$, $p = 0.005$). Levene's $p = 0.047$ and therefore equality of variance was not assumed. A formal approach to scanning is more likely to explicitly identify core areas of market related information to pay attention to, such as market trends and competitor information. The specific differences in means among the scanning modes for the *market* scale were as follows: the *market* scale was significantly higher in formal search mode than informal search mode ($p = 0.015$) and conditioned viewing mode ($p = 0.016$). As the scanning mode categorisation is based on a single survey item only, substantive conclusions concerning validity cannot be drawn. However, given the relationship between the *market* scale and scanning modes is as expected, these results do lend some support to the validity of the newly derived scanning attention scales. No other significant associations emerged between scanning attention scales and scanning modes. For details of the scanning attention scale scores for each scanning mode, refer to the below Table 66.

Table 66: Scanning attention scale scores by scanning mode: Descriptive statistics.

		N	Mean	Std. Deviation	Std. Error
ATTSC1: MARKET	undirected viewing	59	4.5085	1.13522	.14779
	conditioned viewing	119	4.5238	1.17376	.10760
	informal search	92	4.4493	1.32270	.13790
	formal search	108	4.9784	1.08924	.10481
	Total	378	4.6332	1.19880	.06166
ATTSC2: CHAIN	undirected viewing	54	3.7716	1.37639	.18730
	conditioned viewing	111	3.8378	1.17195	.11124
	informal search	91	3.7509	1.31336	.13768
	formal search	103	4.2168	1.35819	.13383
	Total	359	3.9146	1.30372	.06881
ATTSC3: SPECIALIST	undirected viewing	59	4.1582	1.17176	.15255
	conditioned viewing	121	4.1295	1.22351	.11123
	informal search	93	4.1362	1.01467	.10522
	formal search	107	4.4237	1.20060	.11607
	Total	380	4.2184	1.16353	.05969

The second test performed to validate the scanning attention scales was to analyse the correlation between the scanning attention scales and the dimension of specificity of information sought. The specificity dimension was reflected in the statement "I usually

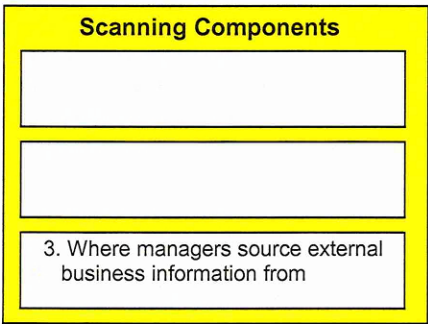
seek out clearly identified types of information.” An *a priori* expectation was that there would be a significant correlation between the specificity dimension and the different scanning attention areas identified (i.e. *market*, *chain*, and *specialist*). This may result as the information areas underlying the scanning attention areas of *market*, *chain*, and *specialist* are all very distinct from one another. As expected, significant results emerged between the specificity dimension and the scanning attention scales as follows: *market* ($r = 0.210$, $n = 388$, $p < 0.001$); *chain* ($r = 0.163$, $n = 367$, $p = 0.002$); and *specialist* ($r = 0.158$, $n = 390$, $p = 0.002$). These results lend some additional validity to the newly derived scanning attention scales.

A third test to validate the scanning attention scales was to analyse the correlation between scanning attention scales and the dimension of purposefulness of search, reflected in the statement “I don’t consciously scan for information unless I have a particular business purpose in mind”. The results showed no significant association between the three scanning attention scales and the dimension of purposefulness of search. This may reflect that whether a search is very purpose driven and specific or very broad in nature, each may involve directing similar levels of attention to the three areas of *market*, *chain*, and *specialist*.

6.2.8 Passive Receipt of Information

One aspect of scanning not considered in the prior tests concerned passive receipt of information, i.e. information that is brought to the attention of a manager through either formal or informal means. It is important to understand this additional means of information receipt in order to more fully understand where managers source information from (i.e. scanning sources). The effect of various influencing variables on scanning sources was tested in Section 6.2.6. This analysis focused only on information passively received. The relevant part of the theoretical framework to which these tests relate is recreated in Figure 33 below.

Figure 33: Scanning sources.



By way of recap, two statements were posed in the survey to elicit information relevant to this proposition. The first relevant statement was: “As part of a formal reporting process (e.g. receipt of market reports, competitor analysis, trend updates, etc.) I receive information about external topics from:”, followed by the following options: “my superiors; my peers, my subordinates; company information reporting systems; external consultants; external market research professionals; and external industry

commentators.” Each option was then rated on a 1 to 7 where 1 = “Very infrequently (for example, once every six months)” and 7 = “Very frequently (for example, once every day or more).” The second relevant statement was: “Informally or casually (e.g. corridor conversations, coffee room remarks, work breaks, social functions), I receive information about external topics from:”, followed by the following options: “my superiors; my peers; my subordinates; external consultants; external market research professionals; and external industry commentators.”

An exploratory set of tests, paired t-tests, were then done to explore for significant differences in the frequency of receipt of information from superiors, peers, subordinates, external consultants, external market research professionals, and external industry commentators.

The significant results of the paired t-tests were as follows: formal passive receipt of information from superiors was significantly lower than informal passive receipt ($t = -6.411$, $df = 381$, $p < 0.001$); formal passive receipt of information from peers was significantly lower than informal passive receipt ($t = -10.140$, $df = 384$, $p < 0.001$); formal passive receipt of information from subordinates was significantly lower than informal passive receipt ($t = -7.510$, $df = 371$, $p < 0.001$); formal passive receipt of information from external consultants was significantly higher than informal passive receipt ($t = 5.589$, $df = 374$, $p < 0.001$); formal passive receipt of information from external market professionals was significantly higher than informal passive receipt ($t = 13.159$, $df = 373$, $p > 0.001$); and formal passive receipt of information from external industry commentators was significantly higher than informal passive receipt ($t = 16.372$, $df = 372$, $p < 0.001$).

7. Analysis

7.1 Pilot Study Analysis

The pilot study results were particularly helpful to identify sub-topics for further data gathering and analysis. The sub-topics identified as significant and explanatory comments were as follows.

The first sub-topic identified was scanning modes. Pilot study participants were able to relate to this managerial activity of “scanning” provided it was defined upfront. The initial definition of scanning provided was based on Aguilar’s (1967) study. Perhaps participants’ recognition of this managerial behaviour is not surprising in light of Mintzberg’s (1973) identification of “the manager as monitor” role. Participants were also able to relate to the scanning mode typology of undirected viewing, conditioned viewing, informal search, and formal search when it was discussed at the end of session. This was sufficient to conclude that the term “scanning” could be used in a broad based survey and that it was reasonable to expect survey respondents to be able to identify which “scanning mode” best described their more usual mode of information search and gathering. While conducting the pilot analysis, the question of whether post graduation education in business and management would impact on scanning mode arose. It was hypothesised that an intensive educational experience that encouraged an outward market orientation and emphasised the importance of information would impact on scanning behaviour. Scanning mode questions were reflected in Q17 of the scanning survey and results and analysis are provided in Section 6.2.1 and Section 7.2.1 of this thesis.

Within the pilot studies participants responded to a number of questions designed to identify what they scan, how they scan, and to a lesser extent, why they scan. Some questions were very specific, such as “which information source do you seek/reply on and why?”, and other questions were more generic and broad, such as “how do you keep in touch with events and trends in your environment?” (Refer to Section 5.2, Research Methods, for a complete list of initial questions used in semi-structured interviews and the type of further probing questions asked.) As these responses varied it became clear that managers differed in terms of how much time they spent scanning. Time spent scanning was not specifically reported on in Aguilar’s (1967) work and only referenced in other studies (Kefalas & Schoderbek, 1973; Keegan, 1974 etc.), often as a percentage of daily activity. Hence, questions concerning time spent scanning and time spent scanning various environmental sectors were built into the scanning questionnaire (refer to Qs 9 and 10 of the scanning survey) and separately reported on in the results section 6.2.2 and analysis section 7.2.2.

The third topic separately reported on and analysed was the relationship between scanning modes and strategy process. Responses to pilot study questions on “what important changes occurred in the last six months?”, “how did you come to learn of these changes?”, and “what kinds of things/information do you pay attention to?” highlighted, among other influences, the influence of roles and responsibilities associated with strategy development processes. The potential link between strategy and scanning has been the subject of prior studies (Hambrick, 1982; Daft, Sormunen & Parks, 1988; Thomas, Clark, & Gioia, 1993) and prompted an analysis as part of this research. Sections 6.2.3. and Section 7.2.3 specifically test and comment on the relationship between three types of strategy process – planning, emergent, and visionary – and scanning mode adoption. These three were chosen as sufficiently differentiable to potentially surface significant differences in the effect of strategy process on scanning mode adoption. In the survey questionnaire, six questions were asked concerning strategy processes that enabled the overriding type of strategy process to be identified (refer to Q13 in the Scanning Survey).

Many direct questions were asked of the pilot study participants concerning items they paid attention to. The initial direct question asked was “what kind of things/information do you pay attention to?”. The responses were then compared to environmental categorization schemes from prior studies (Waller, Huber, & Glick, 1995). As a result, some environmental categories were dropped, e.g. union, and some categories added, e.g. information on current company. A full list of the final fifteen environmental information categories is provided in Section 6.2.4. In the scanning survey, Q8 asks respondents to rate the frequency of attention paid to these fifteen environmental information sectors. The analysis is presented in Section 7.2.4.

Sub-topic number 5 that emerged was scanning behavioural typologies. The results of the pilot studies had a significant influence on this particular sub-topic, more so than any other topic. This topic concerned the individual behaviours that collectively reflect an individual manager’s scanning practices. In the feedback from the pilot studies issues impacting individual scanning behaviour were identified such as role congruence – the extent to which individual’s attention to different types of information is influence by job roles and responsibilities; information overload; information overload coping strategies; the relative significance of the internet as a source of information; difference in emphasis on networking; and varying orientations to learning. These issues were translated into individual statements concerning behaviour and built into Q11 and Q12 of the scanning survey. Results and analysis of this sub-topic are presented in Section 6.2.5 and 7.2.5 of this thesis.

The sixth topic concerned the extent of use of technology sources to provide information versus using more traditional mediums. In the pilot study some striking comments were made on the high use of the internet as an information source. The internet was often both described as a tool to firstly detect items of interest, and secondly, to further investigate in more depth these items. Some comments on the perceived high credibility of this medium were also made; this was in part due to the ability to cross-reference information from multiple online sources. Hence, the role of technology in scanning was separately considered. Results are presented in Section 6.2.6 and analysis in Section 7.2.6. The results were based on responses to Q14 of the

scanning survey which asked about frequency of receipt of information from internet sources including search engines, company websites, email information subscription services, compared to personal networks of individuals outside your company; traditional mediums such as television, radio, newspapers, business magazines etc.; and company personnel such as superiors, peers, and subordinates. Results and analysis of this sub-topic are presented in Section 6.2.6 and 7.2.6.

Sub-topic 7 was closely related to sub-topic 3 concerning items that participant's pay attention to. In Q8 of the survey respondents were asked to rate the frequency of attention paid to fifteen environmental information categories. The environmental information categories used were a combination of relevant categories from Waller, Huber, & Glick's (1995) work and complementary categories that emerged from the pilot studies. However, it was not possible to discern from the pilot studies whether all of these categories were meaningful and significant to most managers when scanning, or whether some of the categories were actually very similar and could effectively be combined. Hence a principal components analysis to examine the relationship among the different environmental category variables was undertaken. The results and analysis of this sub-topic are presented in Section 6.2.7 and 7.2.7 respectively.

The final scanning sub-topic analysed concerned passive receipt of information. In the pilot studies participants commented on situations in which they received unsolicited information. Sometimes this unsolicited information led to "information overload" and participants then described various strategies to manage this (e.g. limiting receipt, networking etc.). In order to comprehensively research scanning activity it seemed necessary to obtain information not only on active scanning behaviour (i.e. initiating the gathering of information and directing of attention), but also on passive receipt of information. Passive receipt of information, both formal and informally communicated, was the subject of Q15 and Q16 in the survey. Results and analysis of this sub-topic are presented in 6.2.8 and 7.2.8 respectively.

In summary, the pilot study analysis, in combination with reflecting on key prior literature on scanning, was instrumental in identifying 8 sub-topics for further analysis: scanning mode adoption; perceived scanning time; strategy process and scanning mode; scanning attention and influences; scanning behaviour typology; technology influence; scanning attention factors; and passive receipt of information. These sub-topics and analytical comments are presented below in Section 7.2.

7.2 Analysis of Results

7.2.1 Scanning Mode Adoption

The scanning mode categorisation used in this section of the analysis was based on Aguilar's (1967) research. Aguilar recognised that for purposes of analysis and description it was necessary to establish some recognisable, even if arbitrary, reference points within the continuum of scanning behaviour. In his research, Aguilar stated that "just as a person's state of mind can be described as depressed, sad, discontented, contented, happy, or elated, even though each of these terms encompasses a myriad of nuances, so scanning activities can be characterized by terms that are meaningful even

if not very precise.” (Aguilar, 1967: 19). These characterisations were described as modes and are recapped in Table 67 below.

Table 67: Scanning mode descriptions.

Scanning Mode:	Description:
Undirected Viewing	Undirected viewing was described as general exposure to information where I have no specific purpose in mind with the possible exception of exploration.
Conditioned Viewing	Conditioned viewing was described as directed exposure, not involving active search, to a more or less clearly identified area or type of information.
Informal Search	Informal search was described as a relatively limited and unstructured effort to obtain specific information or information for a specific purpose.
Formal Search	Formal search was described as a deliberate effort, usually following a pre-established plan, procedure or methodology, to secure specific information or information relating to a specific view.

It was the interpretation of this research that there were two underlying dimensions of Aguilar’s (1967) scanning typology being 1) purposefulness of search, and 2) specificity of information. The results showed moderate support that these two dimensions were correlated in the way hypothesised i.e. increases in purposefulness of search are associated with increases in specificity of information. A correlation of associated statements was significant ($r = 0.108$, $n = 385$, $p = 0.034$). This is useful to keep in mind as it helps to understand the nature of the Aguilar (1967) typology.

Overall, each of the four scanning modes – undirected viewing, conditioned viewing, informal search, and formal search – represented a significant percentage of respondents. The mode selected least was undirected viewing which represented 15.4% of respondents. These results confirmed that none of the individual modes, as they were expressed, are insignificant and irrelevant to the respondents to this research.

The results show that the two most adopted modes are conditioned viewing (31.7%) and formal search (28.3%). These results reflect a clustering around two different types of approach to scanning; formal search is more purposeful and requires greater specificity of information than conditioned viewing. It is interesting that this cluster effect occurs as the underlying dimensions of the modes, purposefulness of search and specificity of information, are continuous across the four modes. In other words, undirected viewing is the least purposeful and involves the least specification of information to search for, whereas formal search is the most purposeful and involves the most specification of information to search for. Hence, if there were a strong

consensus regarding “the right mode” (e.g. conditioned search), then the frequency of adoption of the other modes would be expected to decrease the further they diverged from the consensus mode; i.e. a graduated scale effect. Instead, the view of the respondents varies in terms of what is the appropriate level of purposefulness of search and specificity of information to adopt when scanning. Some respondents (24.6%) consider that informal search is purposeful enough, while others (28.3%) consider that an even more formal approach is desirable.

Conditioned viewing is clearly the most adopted scanning mode (31.7%). This result reflects an approach to scanning that is directed toward specific types of information or information for a specific purpose. It is a broad approach in the sense that the boundaries of information are not rigorously defined, the specific methods to gather the outlined information are not predetermined, and the format by which the results should be reported on is not defined. The description of conditioned viewing has some intuitive appeal as a preferred method of scanning; it implies an exploratory approach that is not initially bounded as to what information may be gathered and reported on. On the other hand, it is an approach that may lack sufficient direction to result in information and insights that are adequate to contribute to the strategy formulation and insight generation processes within an organisation.

If you consider that scanning modes, as initially defined, are determined on a spectrum of two dimensions – purposefulness of search and specificity of information – then it is valid to do an analysis of the middle position, i.e. the percentage of adoption of modes that are “viewing” (undirected viewing and conditioned viewing) and those modes that reflect “search” (informal search and formal search). This analysis shows that the two overall groups – “viewing” and “search” – are split almost evenly: 47.1% and 52.9% respectively.

Within the “viewing” group, it is clear that conditioned viewing is the more adopted mode; it is more than double the adoption rate than unconditioned viewing i.e. an overall 31.7% adoption compared to just 15.4% for unconditioned viewing. We could infer from this that overall managers consider that direction orientated information search activities, albeit loosely defined, have greater perceived utility than more purely exploratory information search activities.

Within the “search” modes, the profile is different; formal search and informal are more equally adopted at 24.6% for informal search and 28.3% for formal search. These manager adoption rates suggest that both of these modes are desirable, with somewhat equally dividing views on the degree of formality of the information search activities, from moderately formal to very formal.

Non-MBAs

The Non-MBA respondent profile of mode adoption is different from the overall respondent group. When the overall respondent group was analysed into two groups – “viewing” and “search” – the adoption rate of each was almost equal, with a slight bias to “search” i.e. 47.1% “viewing” compared to 52.9% “search”. When this analysis is done for the Non-MBA respondent group, there is a bias not toward “search” but

instead toward “viewing”; Non-MBA “viewing” is 55.1 % compared to “search” of 44.9%. Therefore, the Non-MBAs approach to scanning is less formal than the overall respondent group, and unsurprisingly, even further less formal than the MBA respondent group.

Similar to the overall respondent group, the scanning mode most adopted by Non-MBAs was conditioned viewing. For the Non-MBAs the adoption of the conditioned viewing mode was relatively more significant than either the overall respondent group or the MBA respondent group; 35.7% of Non-MBAs adopt conditioned viewing as their predominant mode.

It is interesting that among the Non-MBAs there is a gradual decline in the adoption of modes from unconditioned viewing through to formal search; unconditioned viewing is adopted by 35.7%, informal search by 24.5%, and formal search by 20.4%. As the underlying dimensions of the modes are purposefulness of search and specificity of information, this gradual decline in adoption may reflect that Non-MBAs consider that the effectiveness of scanning is gradually decreased in proportion to increases in formality of approach.

MBAs

The MBA respondent profile was distinguishable from the overall respondent profile. When the overall respondent group was analysed into two groups – “viewing” (i.e. undirected viewing and conditioned viewing) and “search” (i.e. informal search and formal search) – the adoption rate of each was 47.1% compared to 52.9%. When this analysis is done for the MBA respondent group, there is a further skew toward “search”; MBA “viewing” is 44.4% compared to “search” of 55.6%. Therefore, the MBAs approach to scanning is more formal than the overall respondent group, and as shown above, relatively more formal than the Non-MBA respondent group.

Unlike the Non-MBA profile, the adoption across the different modes is not graduated. Instead, the adoption of conditioned viewing approximates the adoption of formal search; 30.3% compared to 31%. This reflects that adopting alternative modes is not simply a trade-off on the dimension of formality. Many MBAs are consciously adopting a form of “viewing” (i.e. conditioned viewing) on par with the most formal of search modes.

While there is evidence of significant adoption of one form of viewing, i.e. conditioned viewing, this does not extend to the other form of viewing, undirected viewing. In fact, undirected viewing mode selected by MBAs had the lowest adoption of any single category of mode across the results for both Non-MBAs and MBAs. MBA adoption of undirected viewing was just 14.1%.

Non-MBA versus MBA

The research results, through a chi-square test, revealed that MBA status did not have a significant effect on scanning mode adoption ($\chi^2 = 4.890$, $df = 3$, $p = 0.180$). While the overall degree of association between MBA status and scanning modes did not emerge

as significant according to the chi-square test, it is instructive to note some differences evidenced through an analysis of the cross-tab table. The biggest difference identified between MBAs and Non-MBAs was in formal search adoption; Non-MBAs were 20.4% compared to MBAs at 31%. A further notable difference between these groups was in undirected viewing; Non-MBAs were 19.4% compared to MBAs at 14.1%. Hence, the key to understanding the differences between the two groups, Non-MBAs and MBAs, lies at the boundaries of the modes, or the boundaries of the dimensions of purposefulness of search and specificity of information. Once again, these results point toward a higher degree of preference for a formal approach to scanning by the MBA group, and a high degree of comfort and adoption of a less formal approach by the Non-MBA group.

Industry affiliation

In addition to MBA status, an analysis of the results shows that industry affiliation had a significant effect on scanning mode adoption ($\chi^2 = 22.008$, $df = 9$, $p = 0.009$). Four Industry groups were analysed being: Manufacturing (SIC '92 Code D); Transport, Storage, and Communication (SIC '92 Code I); Financial Intermediation (SIC '92 Code J); and Real estate, renting, and business activities (SIC '92 Code K).

One of the most obvious differences in scanning mode adoption among these four industry groups is the high rate of adoption of conditioned viewing within the Manufacturing sector of 42.5%. This is significantly higher than Transport, Storage, & Communication (31.3%), Financial Intermediation (32.9%), and Real estate, renting, & business activities (25.2%).

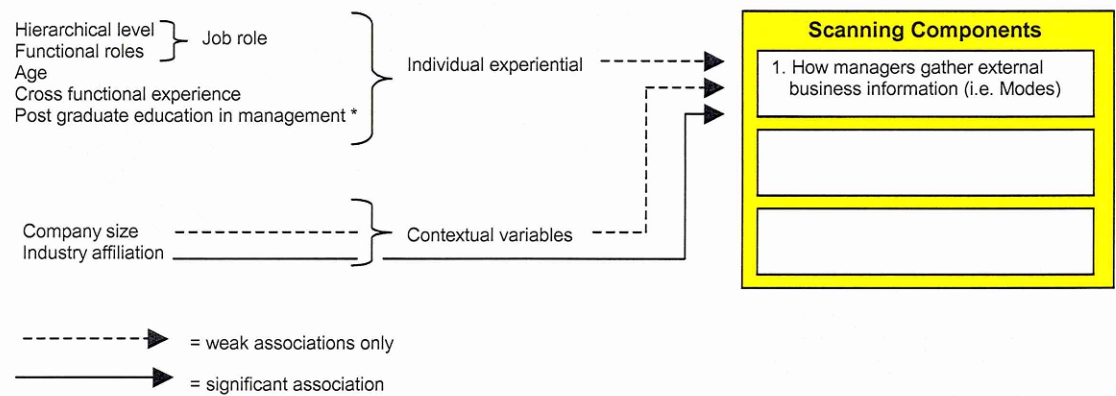
A further notable difference upon analysis of industry effects on scanning mode adoption, is that managers within the Real estate, renting, and business activities sector adopt significantly less undirected viewing – 10.9 % - compared to Transport, Storage, and Communication – 18.8%; and Financial Intermediation – 25.9%. Related to this, managers within the Real estate, renting, and business activities sector adopt significantly more informal search – 33.6% - compared to Manufacturing – 16.3%; Transport, Storage, and Communication – 21.9%; and Financial Intermediation – 17.6%. The net analysis is that managers within Real estate, renting, and business activities sectors are relatively more formal in their approach to scanning. This may be due in part to the high proportion of consultants, research and development management, and computer related consultants who are categorised within the Real estate, renting, and business activities sector. Of the total 119 Real estate, renting, and business activities classified respondents, 85 of these are consultants in the categories just described; this equates to 71.4% of the total Real estate, renting, and business activities classified respondents. It is likely that consultants in the fields of management, research and development, and computer related matters, are more likely to engage in systematic and formal forms of scanning. The dimension of *formality* is elaborated on further in the Section 7.2.5 concerning scanning behaviour components.

A final analytical comment regarding industry affiliations and scanning modes concerns the formal scanning mode. The formal mode adoption rates for the major industries analysed were as follows: Manufacturing was 30%; Transport, Storage, and Communication, 28.1%; Financial Intermediation, 23.5%; and Real estate, renting, and business activities, 30.3%. The average formal mode adoption rate across these industries was 28%. This suggests that regardless of the industry, a minimal amount of scanning in formal mode is taking place, and that among the managerial ranks it represents approximately a quarter of individual scanning behaviour per industry category.

Summary analytical comments on other influencing variables on scanning mode adoption

This analysis showed that there were surprisingly few significant associations between the influencing variables tested and the adoption of scanning modes; in fact there was only one statistically significant overall association which was between industry association and scanning modes ($\chi^2 = 22.008$, $df = 9$, $p = 0.009$). This is reflected in the below Figure 34 which highlights the one significant association to emerge.

Figure 34: Scanning modes and influencing variables.



It is particularly interesting that MBA status was not statistically significantly associated with scanning mode adoption. On the basis of this test for association, it was not necessary to separately analyse the results of these two groups as discrete groups. Instead, the results of scanning mode adoption rates may be generalised onto the manager population group as whole.

These results also suggest that the characteristics underlying the scanning modes, i.e. purposefulness of search and specificity may be work routines that individuals develop which are particular to them. The lack of strong association of the tested influencing variables (i.e. MBA status, size of company, hierarchy, functional roles, age, cross-functional experience) on scanning mode adoption suggests that these influences are weak and remote and do not substantially impact upon established scanning routines that individuals develop. Further comments on the individualised nature of scanning are made in Section 7.2.5.

7.2.2 Perceived Scanning Time

The average perceived time spent scanning per week was 9.80 hours mean, 8 hours median score, and 10 hours for the mode. This is a significant amount of time at approximately 1 day per average working week or 20 % of average contracted weekly work hours based on the median score.

Recall that scanning is just one of 10 managerial roles according to Mintzberg's (1973) study. Mintzberg termed the scanning role as "monitor" which was classified as one of the informational roles of a manager. Given that scanning is just one of 10 roles – the other roles being figurehead, leader, liaison, disseminator, spokesman, entrepreneur, disturbance handler, resource allocator, and negotiator – the percentage of time it consumes, i.e. approximately 20%, is significant.

The results showed that the perceived time spent scanning per week for scanning modes of undirected viewing, conditioned viewing, and informal search are reasonably close to one another. The mean perceived scanning times per week for these modes were: undirected viewing – 9.24 hours; conditioned viewing – 8.95 hours; and informal search – 8.30 hours. Statistical comparison tests did not identify any differences among these mean times for perceived scanning to be significantly different. One implication is that if managers are considering consciously making decisions about which of these three scanning modes to adopt, or which individuals to involve in scanning practices, then these decisions are made on a basis other than time commitment.

Overall, an ANOVA test indicated that scanning mode does effect perceived weekly scanning time ($F_{(3,350)} = 5.251, p = 0.001$). All of the statistically significant differences among mean times for perceived scanning across scanning modes occurred when compared to the perceived time spent in formal search mode. The significant results of the Dunnett T3 post-hoc comparison tests were that perceived time spent scanning via conditioned viewing was significantly lower than that for formal search ($p = 0.020$), and informal search was also significantly less than formal search ($p = 0.002$). The average perceived time spent scanning in formal search mode was relatively high at 12.14 hours per week. This is consistent with expectations that formal search does involve a greater set of detailed activities and involves deliberate effort on behalf of managers and hence consumes significant time.

MBA

Managers with MBA status reported significantly higher perceived scanning time per week than Non-MBA status managers; 10.30 hours compared to 8.34 hours respectively. This significant difference was confirmed by t-test ($t = 2.459, df = 193, p = 0.015$). This higher figure for MBAs is consistent with them adopting more formalised approaches to scanning than Non-MBAs. It is reasonable to propose that MBA training emphasises the value of information and adopting an externally orientated view. This may result in changed scanning behaviour and the adoption of additional scanning techniques that may require a greater time investment.

Size of company

The results of an ANOVA test show that the size of company had a significant effect on perceived time spent scanning per week ($F_{(2,348)} = 3.871$, $p = 0.022$). The main finding of a Dunnett T3 post-hoc comparison test was that managers in large companies, companies with annual revenues greater than £101m, report perceived time spent scanning that is significantly larger than that reported by managers in medium sized companies ($p = 0.009$); 10.56 hours compared to 7.98. This may reflect a greater allocation of resources to scanning related activities coupled with a higher degree of formality in large firms.

An analysis to further explore what might explain the larger reported perceived time spent scanning in large firms was undertaken. All of the known influencers of scanning time were considered independently. First, functional role which was shown to significantly effect scanning time was considered. The issue considered was whether managers in the large company size group comprised a disproportionately high number of business developers and operational managers; these functions are associated with more time spent scanning than the other functions of general management and support. In fact, there were proportionately more business managers and operational managers in large firms (45.6%) compared to the medium sized firms (37.7%). However, there was not an overall significant difference. Hence, an analysis of the mix of functional roles within different sized companies did not solely explain the bias for managers in large firms to scan more. Second, the mix of MBA versus Non-MBAs within the different size firms was considered. The issue was whether there was a disproportionately large percentage of MBAs within the large company size group; MBAs are associated with more time spent scanning than Non-MBAs. The mix of MBAs to Non-MBAs is in fact higher in large companies; large companies comprise 77% MBAs in this sample. This is higher than the equivalent measure in mid-sized companies at 64.2%, but less than the equivalent measure in small-sized companies at 85.4%. Hence, when comparing the perceived scanning times for large companies compared to medium sized companies, the relatively higher mix of MBAs in large companies contributes to the higher perceived time outcome. Third, the scanning mode was considered. The issue considered was whether there was a disproportionately large percentage of formal scanners within the large company size group; formal scanners consume more time scanning than any of the other modes. The percentage of formal scanners within the large company group was 33.5%; this was larger than in the mid-sized company group at 22.3%, and larger than in the small size company group at 24.1%. Hence, the scanning mode mix contributes to the outcome that managers in large sized companies spend more perceived time scanning than those in mid-sized and smaller companies.

Managers in smaller companies appear to spend significant time scanning – 10.06 hours per week; slightly higher than reported within medium sized companies of 7.98 hours per week. In general, it appears that regardless of size of company, managers are spending a base amount of significant hours – 7.98 and upwards – engaged in scanning.

Functional roles

As might be expected, managers in the business development related functional areas recorded the highest perceived weekly scanning time of 11.63 hours. This is consistent with the external outward facing role assumed by business development managers. Their need to understand the market, trends, customer needs, competitors etc. is a driver of information needs and consequent scanning activity.

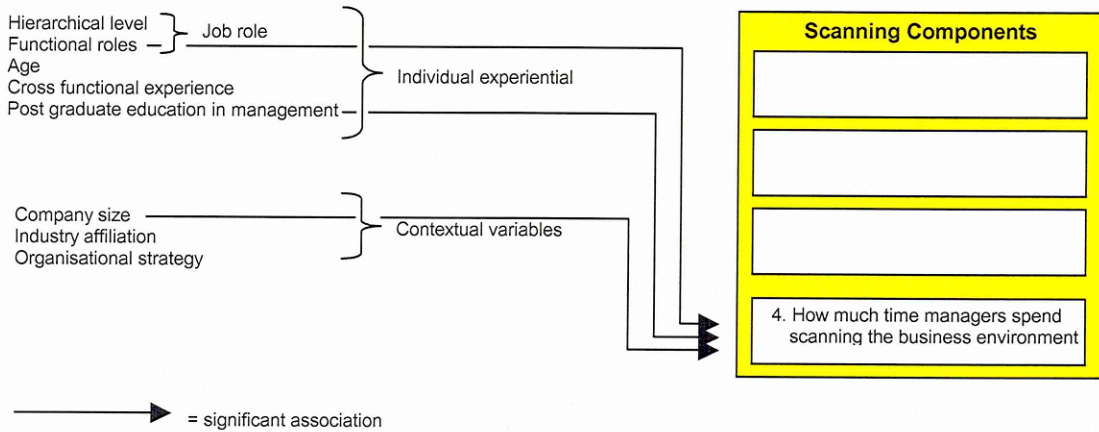
It is interesting that business development managers engage in significantly more scanning per week than general management – 11.63 hours compared to 9.29 – but not especially surprising that there is this difference. This significant difference was confirmed by a Dunnett T3 post-hoc comparison test result of $p = 0.005$. More surprising is that operational orientated management were shown to scan more than general management – 10.95 hours compared to 9.29 hours. However this difference was not significant. The operational information needs may be driven by the need for functional specialist information and information on management techniques to improve performance. Research and development information is also a part of the activities grouped within the operational category that contributes to the reasonably high level of scanning time.

Those managers in the support related functions recorded the lowest perceived time spent scanning per week at 7.75 hours. These roles are opposite to business development in terms of their more inward focus. The low level of hours is not a surprise and was confirmed by the results to be significantly lower compared to both business development and general management.

Summary analytical comments on perceived scanning time

The ANOVA tests conducted did not identify a significant effect of hierarchy, age, industry affiliation, and cross-functional experience on reported scanning time per week. The only significant effects on perceived scanning time per week evidenced through this study were scanning mode ($F_{(3,350)} = 5.251, p = 0.001$), size of company ($F_{(2,348)} = 3.871, p = 0.022$), functional roles ($F_{(3,356)} = 4.051, p = 0.007$), and education (i.e. MBA status) ($t = 2.459, df = 193, p = 0.015$). Therefore, it is possible to outline an initial tentative model of those variables that appear influential upon scanning time, and those variables that are remote and exert weak influence only, as in Figure 35 below. Note that in Figure 35 the significant associations are illustrated with a solid arrow. The independent variables not illustrated with an arrow were shown to be weak or not significantly associated with scanning time. It is also possible to consider the order of significance of certain variables; based on Omega squared results (i.e. the % of variance in the dependent variable explained) the order of significance from highest to lowest is scanning mode (3%), functional membership (2.5%); size of company (1.6%); and MBA (1.5%). These results can serve to illustrate a small degree of relative influence on perceived scanning time only.

Figure 35: Scanning time and influencing variables.



Multivariate analysis of factors that might influence scanning time

An additional analysis was undertaken for the effect of the key independent variables identified in prior scanning studies (i.e. hierarchical level, functional roles, age, cross functional experience, post graduate education in management, company size, and industry affiliation) on scanning time. The technique adopted was multiple regression.

A summary of the coding for each of the independent variables is outlined in the Table 68 in Section 7.2.5. Given that the sample size in this research was reasonably large at 394 cases, it was possible to use multiple regression to analyse this data (Asher, 1983).

In this case, multiple $R^2 = 0.074$; $F_{(13,314)} = 1.937$, $p < 0.05$. This result meant that only a very small percentage of the variability in the dependent variable *time* was accounted for by the independent variables tested. Only one of the individual coefficients was significant; Non-MBA status was negatively predictive of *time* ($\beta = -0.127$, $p < 0.05$). This serves as further confirmation that MBA training may result in changed scanning behaviour through emphasising the value of information and adopting an externally orientated view. This may result in the adoption of additional scanning techniques and analysis that may require a greater time investment. By way of recap, the underlying data was that managers with MBA status reported average weekly scanning time of 10.30 hours compared to Non-MBA status managers who reported average weekly scanning time of 8.34 hours. For a summary of the Beta coefficients, R^2 , and Adjusted R^2 results from the above multiple regression computations, refer to Appendix O, Summary of multiple regression results.

A separate set of ANOVA tests and analyses were performed for the independent variables of visionary strategy process, emergent strategy process, and planning strategy process. No significant results emerged between strategy process adoption and time spent scanning.

7.2.3 Strategy Process and Scanning Mode

Strategy process planning and scanning mode

Overall, there was a significant interaction effect between planning strategy process and scanning mode ($\chi^2 = 14.102$, $df = 6$, $p = 0.029$). Respondents were grouped into three groups – high, medium, and low. The “high” category comprised respondents who strongly agreed with the statement “We have well defined planning procedures to search for solutions to strategic problems”; the “medium” category agreed moderately with the statement, and the “low” category agreed least with the statement.

An analysis shows that the “high” respondent group engaged in relatively more formal search activity than the “medium” and “low” groups. Within the high group, 35.2% of managers adopted formal search as their predominant mode, compared to 25.6% within the medium group, and just 21.9% within the low group. This result is consistent with expectations that a formalised approach to scanning would be congruent with a formal strategy planning process (Ansoff, 1965; Andrews, 1971; McDonald, 1996).

Interestingly, in the high group, the level of informal search is relatively low. Within the high group, only 16.6% of managers adopt informal search as their predominant planning mode. This compares to 26.4% within the medium group, and 33.3% within the low group. It seems as though within the high group, the onus is on doing formal search activities, and activities that are partially formal (i.e. informal search), may not be sufficiently formal within the context of a firm that is highly orientated to doing strategy process planning. Whereas, the low group appeared to disengage from doing formal search in favour of informal search.

Strategy process emergent and visionary relationship to scanning mode

There was not a significant association between emergent strategy process and scanning mode ($\chi^2 = 10.628$, $df = 6$, $p = 0.101$). Respondents were grouped into three groups – high, medium, and low. The “high” category comprised respondents who agreed strongly with the statement “We tend to develop strategy by experimenting and trying new approaches in the market place”, the “medium” category agreed moderately with the statement, and the “low” category agreed least with the statement.

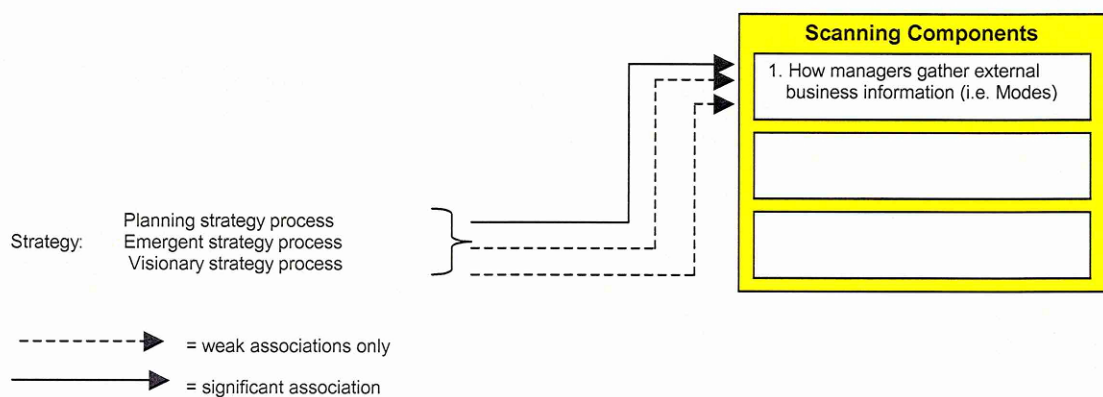
Initial expectations were that the “high” group would engage in more “viewing” than “search”. The basic reasoning was that if high planning strategy process is associated with high formal scanning mode, then emergent strategy, which is at the opposite end of the strategy spectrum, would be associated with less than average formalised search procedures or modes. In fact, this was not the case at all. Within the high group, the respondents in the “viewing” category (i.e. undirected viewing and conditioned viewing) were 44.6%. This was actually lower than the equivalent measure for respondents in the low group, i.e. 46.4%, and lower still than respondents in the medium group, i.e. 57.4%.

Similarly, there was no significant association between visionary strategy process and scanning mode ($\chi^2 = 8.013$, $df = 6$, $p = 0.237$). Initial expectations were that the “high” group would engage in more conditioned viewing than other scanning modes. This assumption was on the basis that senior management, or the dominant executive, would dictate the direction of any search activity to be done by the management group. Hence, the resultant scanning activity would be directed to a particular type of information or area or done with a particular purpose in mind. It was thought that the mode dictated by a visionary leader would probably be less than formal, and hence the dominant mode would be conditioned viewing. In fact, the “high” group adoption of conditioned viewing was 32.7%, which was higher than the equivalent measure for the “low group”, i.e. 27.2%, but lower than the equivalent measure for the “medium” group, i.e. 34.1%. Hence, the results did not indicate a strong association one way or the other.

Overall analytical comments on strategy process planning, emergent, and visionary to scanning mode

Overall the results of the chi-square tests showed there was not a strong association between type of strategy process and scanning mode adoption, with the exception of a significant relationship between high planning strategy process and formal search scanning mode ($\chi^2 = 14.102$, $df = 6$, $p = 0.029$). It may be that organisations are not explicitly diagnosing their strategy processes and thereafter attempting to alter scanning practices and behaviour that best support their chosen processes. Or alternatively, it may be that scanning behaviour is an individual routine behaviour and that of the determinants of scanning behaviour, strategy process is not significant. These overall results are reflected in the Figure 36 below.

Figure 36: Strategy process and scanning mode.



Analytical comments on top tier managers, strategy processes, and scanning modes

It is also possible that among the group of managers analysed, not all of them are intimately knowledgeable or aligned with the firm's strategy process. This is likely to be more the case for those managers at the lower levels, i.e. further levels below the CEO or MD. It was thought that if top-tier managers have been intimately involved in the creation of the strategy process, their ownership and resulting actions, including their scanning behaviour, may be more highly aligned with the strategy process. If so, then a significant interaction between strategy process and scanning modes may emerge. Hence, a further analysis was done just on those top tier managers, i.e. those at 0 or 1 level below CEO or MD. For this top tier of manager, an analysis was conducted to test for the relationship between three types of strategy process – i.e. planning, emergent, and visionary – and scanning mode adoption.

Results of the first additional test, a test of association between planning strategy process and scanning mode for top-tier managers, did show a significant association ($\chi^2 = 12.737$, $df = 6$, $p = 0.047$). Similar to the prior overall test of association between planning strategy process and scanning mode, the planning strategy process group 3 ("high scores") adopted a relatively high percentage of formal search at 31.4%; this was significantly higher than the planning strategy process group 1 ("low score") at 8.3%. These results appeared to re-confirm that a formalised approach to scanning is congruent with a formal planning strategy process.

Results of the second additional test, a test of association between emergent strategy process and scanning mode to top-tier managers, did not show a significant association ($\chi^2 = 2.121$, $df = 3$, $p = 0.548$); in fact, the degree of association was less than the equivalent test run for all tiers of managers ($\chi^2 = 8.529$, $df = 6$, $p = 0.202$). This may be because in emergent strategy it is not necessarily the case that senior management are more aware and aligned with the firm's strategy. Indeed, the nature of emergent strategy may suggest that it is managers in lower levels of the organisation that may be more knowledgeable of phenomena that will be the basis for the firm's strategy than at higher levels. This is more likely to be the case in organisations adopting emergent strategy than any other form of strategy.

Results of the third additional test, a test of association between visionary strategy process and scanning mode to top-tier managers, did not show a significant association ($\chi^2 = 0.478$, $df = 3$, $p = 0.924$). A pattern of preference among top-tier managers to adopt more "viewing" scanning modes (i.e. undirected viewing and conditioned viewing) over "search" scanning modes (i.e. informal search and formal search) did emerge; 59.2% to 40.7% respectively. In addition, a trend of relative greater conditioned viewing within those top-tier managers who rated "high" on visionary strategy process over those top-tier managers who rated "low" on visionary strategy process did emerge; 41.4% compared to 38%. However, the differences in profile of scanning modes between top-tier managers who rated "low" on visionary strategy process and those who rated "high" was not significant overall.

Hence, there did not emerge a strong association between strategy process and scanning mode adoption, based on the mix of tests and analysis used above. The

exception was a significant association between high planning strategy process and formal search scanning mode ($\chi^2 = 12.737$, $df = 6$, $p = 0.047$). These results may be interpreted as supporting the notion that scanning behaviour is an individualised routine or embedded behaviour that does not significantly change due to differing strategy process contexts. The idea that scanning modes or behaviour are ingrained is supported by the mix of modes present in general, within industries, and within different sized firms. In all of these different contexts there are individuals representative of the different scanning modes, suggesting that scanning is a more complex behaviour than simply being dependent on a few exogenous variables, including strategy process.

Given that scanning is an integral part of strategy formulation processes, it would seem desirable to consciously determine scanning modes and the mix of modes among those who influence strategy formulation. Note that “consciously” determining scanning modes is not intended to mean “formalising” scanning mode adoption; some scanning modes (e.g. undirected viewing) may be very informal in nature but still capable of being consciously identified and incorporated into strategy formulation. However, as there does not appear to be an obvious pattern among scanning modes and strategy process adoption (with the one exception of planning strategy process and formal scanning mode), it could be inferred that there has not been a conscious effort among firms to align scanning modes to strategy processes or that it is very difficult to achieve this alignment as individuals ultimately resort to their individualised scanning routines. This research lends support to the latter possibility that individuals do develop scanning routines or embedded work patterns connected with learning about events and trends in the environment outside their organisation. One major implication of this view is that developing an organisational scanning capability requires developing practices “around” individuals rather than assuming strategy processes will shape individual scanning behaviour. “Around individuals” means firstly appreciating an individual’s predominant scanning mode and the environmental sectors that the individual is orientated to pay attention toward.

7.2.4 Scanning Attention and Influences

Overall analysis of attention paid to environmental information types

The most frequently viewed type of environmental information was “information about your current company” which was rated at a mean score of 5.76 where a rating of 1 was equivalent to “very infrequently” (for example, once every 6 months or less) and a rating of 7 was equivalent to “very frequently” (for example, once every day or more). This result may be considered unusual if it was expected that top management would be orientated to external information that could not be gained through internal company sources. However, in the pilot studies it was suggested that scanning for current company information is understandable as it is helpful for many managers who do not have complete access to all internal company information and may often not learn of major company events and decisions until they have been made public. Further, monitoring company information in the public domain allows managers to gauge how company events are being portrayed in the business environment and enables an assessment of the public relations position of the company.

The second most frequently viewed type of environmental information was “trends within your company’s industry” which was rated at a mean score of 5.03. This is consistent with expectations of trends information being most pertinent to managers. Industry trends are perceived to be more immediately impactful on an individual company than macro-level trends. Industry trends are useful to managers to identify and frame relevant and short to medium term strategic issues at the company level.

“Functional specialist information” was the third most frequently viewed type of environmental information. This relative high rating of frequency, third highest out of fifteen types of environmental information, is consistent with prior studies in the field of strategic management that have highlighted the biases of managers to information most relevant to their current functional speciality.

The fourth and fifth most frequently viewed types of environmental information respectively were competitor companies (4.52) and customer companies (4.49). These information types are consistent with information that feature in traditional models of environmental analysis.

Positions 6 through to 10 in order of frequency of viewing were as follows: macro level economic information (4.37); regulatory, governmental, and legislative information (4.35); major business leader commentaries (4.20); emerging technologies with potential to impact business (4.16); and innovation in a competing product or service (3.96). Arguably these types of information can be further summarised into three major types that were popular in the following order – 1) high level industry influences (i.e. macro level economic information and regulatory, governmental, and legislative information), 2) business commentary and expert views (i.e. major business leader commentaries), and 3) innovation information of relevance at the business and product level (i.e. emerging technologies with potential to impact business and innovation in a competing product or service).

The five least frequently viewed types of information were joint venture or alliance partner information (3.68), supplier companies (3.65), management techniques (3.63), spending priorities of other companies (2.70), and information about your prior employer company (ies) (2.59). Of these five types of environmental information, three relate to company specific information, i.e. joint venture or alliance partner, supplier companies, and spending priorities of other companies. The specialist nature of joint ventures and alliance partners may explain the relatively low rating of attention paid to this type of information. Supplier company information is rated lower than information on customers and competitors at the “demand” end of the supply chain. Although information on competitors is highly ranked overall at 4.52, the attention afforded to information on the spending priorities of companies, including competitor companies, is low rated at 2.70 possible due to the difficulty of obtaining this type of information to begin with.

Finally, it is interesting that information on management techniques is rated low at 3.65 and position thirteen out of fifteen environmental types of information, reflecting a clear deprioritisation of the need to frequently seek out generic advice on business and managerial issues.

Size of company effect on frequency of attention to environmental information types

Of all of the determinants of frequency of scanning attention to environmental information types tested (i.e. size of company, hierarchical levels, functional roles, age, industry affiliations, scanning modes, cross-functional experience, and MBA status), size of company significantly impacted on more environmental types of information than another other determinant. According to the ANOVA tests run, size of company had a significant effect on attention paid to 6 of the 15 environmental information types being management techniques ($F_{(2,376)} = 4.099$, $p = 0.017$); customer companies ($F_{(2,368)} = 3.819$, $p = 0.023$); supplier companies ($F_{(2,368)} = 5.401$, $p = 0.005$); information about your current company ($F_{(2,374)} = 3.450$, $p = 0.033$); regulatory, governmental, and legislative information ($F_{(2,376)} = 3.275$, $p = 0.039$); and competitor companies ($F_{(2,374)} = 3.198$, $p = 0.042$).

According to the post-hoc comparison test results there were two types of information which small sized companies paid significantly more attention to than large sized companies. A Tukey post-hoc comparison test showed that small sized companies paid significantly more attention to information concerning management techniques than large sized companies ($p = 0.027$). A Dunnett T3 post-hoc comparison test showed that small sized companies paid significantly more attention to customer companies than did large sized companies ($p = 0.027$). Small companies rated attention to management techniques at 3.94 compared to large companies that rated just 3.41. Small companies rated attention to customer companies at 4.86 compared to large companies that rated just 4.28. In both these information areas it is interesting to note that there was a uniform decrease in frequency of attention based on size of company, i.e. small companies paid most attention, medium sized companies paid relatively less attention, and large companies paid least attention. Without further inquiry we can only infer that small companies pay particular attention to their customers and customer related information as a crucial part of maintaining and developing business, and that techniques to better manage their business are also of immediate value.

There was one area to which medium sized companies paid significantly more attention than large sized companies, being supplier company information. This was confirmed in a Tukey post-hoc comparison test in which $p = 0.005$. This could reflect attention to an area that is particularly significant to mid-sized firms. Firms are not yet large enough to be able to develop and leverage significant buying power and the role of suppliers is increasingly important to sustaining performance and position and transitioning through the next growth stage.

The only other statistically significant post-hoc result to report was that large companies pay more attention than medium sized companies to information on competitor companies. This was confirmed in a Tukey post-hoc comparison test in which $p = 0.035$. This may reflect the ability to commit greater managerial and system resources to identify significant competitor activities that may emerge as a threat to a large incumbent firm's position.

The initial ANOVA test identified two further information areas that were impacted by firm size – information about your current company ($F_{(2,374)} = 3.450$, $p = 0.033$); and

regulatory, governmental, and legislative information ($F_{(2,376)} = 3.275, p = 0.039$). However the more conservative post-hoc comparison tests did not identify statistically significant differences in frequency of attention to these two information areas when compared across different sized companies.

Hierarchical level effect on frequency of attention to environmental information types

According to the ANOVA test results, hierarchical level had a significant effect on the frequency of attention to three types of environmental information: major business leader commentaries ($F_{(2,379)} = 3.154, p = 0.044$), management techniques ($F_{(2,380)} = 4.560, p = 0.011$), and information about your prior employer company(ies) ($F_{(2,353)} = 3.674, p = 0.026$).

For two of these three types of environmental information, the top tier managers paid significantly more attention than the bottom tier managers. This was confirmed in a set of Tukey post-hoc comparison tests. The two information areas to which top tier managers paid significantly more attention than bottom tier managers were major business leader commentaries ($p = 0.043$) and management techniques ($p = 0.010$). For both these information areas it is interesting to note that there was a uniform decrease in frequency of attention based on hierarchy, i.e. top tier managers paid most attention, medium tier managers paid relatively less attention, and bottom tier managers paid least attention.

Top tier attention to major business leader commentaries may reflect a higher than average interest in peer group commentaries and behaviour and an effort to understand or predict the intent of other corporations and consider specific implications.

The more senior the manager the more attention paid to management techniques information. Top tier managers rated frequency of attention to this type of information at 3.89, mid-tier managers rated 3.69, and lower tier managers rated 3.28. This is consistent with top tier managers putting more emphasis on seeking out ways to improve managerial techniques along with having the requisite authority to critically review management practices and to change them as deemed necessary.

The third environmental information area impacted by hierarchy was “information about your prior employer company (ies)” ($F_{(2,353)} = 3.674, p = 0.026$). For this area, a Tukey post-hoc comparison test confirmed that top tier managers paid significantly more attention than medium tier managers ($p = 0.026$). This may result from top tier managers having more experience and more ex-employers to monitor. In any case, the overall frequency of attention is low; top tier managers rated at 2.92 only. Overall, this type of information was rated fifteenth of fifteen environmental information types in terms of frequency of attention and hence not a high priority for further analysis and commentary.

Functional roles effect on frequency of attention to environmental information types

According to the ANOVA test results, functional roles had a significant effect of the frequency of attention paid to two types of environmental information: functional

specialist information ($F_{(3,385)} = 8.838$, $p < 0.001$), and customer companies ($F_{(3,379)} = 3.642$, $p = 0.013$).

For functional specialist information, the frequency of attention paid by general managers rated at 4.63 and business development managers rated at 4.80 was significantly lower than attention afforded by operations management (i.e. managers in operations, production, research and development, engineering functions) rated at 5.77. This was confirmed in a Dunnett T3 post-hoc comparison test in which $p < 0.001$ in both instances. The next highest level of frequency of attention paid to functional specialist information was paid by managers in support functions (i.e. HR, Finance, Legal) rated at 5.23. These results confirm an intuition that managers working in internal highly specialised functional roles would seek out the most pertinent information to them which is organised by functional speciality.

The above analysis is in contrast to the analysis of the frequency of attention paid to customer companies' information. In this case, the more external orientated group of managers, the business development managers, paid significantly more attention to this type of information rated at 4.92, compared to managers in support functions (i.e. 3.94). This was confirmed in a Tukey post-hoc comparison test in which $p = 0.008$. Again, intuitively these results are consistent with expectations of the degree of attention afforded to different types of information given differing role demands, i.e. business developers could be expected to focus on customer information while internal specialist support units focus on specialist technical information of direct relevance.

Age effects on frequency of attention to environmental information types

According to the ANOVA test results, age had a significant effect on the frequency of attention paid to two types of environmental information: functional specialist information ($F_{(3,372)} = 3.106$, $p = 0.027$) and spending priority of other companies ($F_{(3,368)} = 3.716$, $p = 0.012$).

For functional specialist information, the frequency of attention paid by age group 2 (i.e. born between 1.08.61 and 28.02.66) rated at 5.06 was significantly higher than that paid by age group 4 (i.e. born between 5.01.69 and 16.02.77). This was confirmed in a Tukey post-hoc comparison test in which $p = 0.046$. An analysis of the strength of ratings across the four age groups does not indicate a trend. For example, it is not the case that frequency of attention to functional specialist information reduces from oldest managers through the youngest managers. Nor is there any obvious bias when the managers are split into two age groups only for analysis: the oldest age group, age group 1 (i.e. born between 30.06.41 and 30.07.61), rated 5.03 which was very similar to the rating of the third oldest group, age group 3 (born between 1.03.66 and 4.01.69) at 5.01. The result is not readily explainable and in the absence of any strong hypotheses on the impact of age on attention paid to various environmental types of information, no further analysis was pursued.

The other statistically significant result identified was concerned with information on the spending priorities of other companies. This result showed that managers in age group 2 (i.e. born between 1.08.61 and 28.02.66) who rated 2.97 paid significantly

more attention to the spending priorities of other companies than managers in age group 1 (i.e. born between 30.06.41 and 30.07.61) who rated 2.38. This was confirmed in a Tukey post-hoc comparison test in which $p = 0.034$. Upon further analysis of the ratings of the other two age groups there did not appear to be any discernible trend. Age group 3 (i.e. born between 01.03.66 and 04.01.69) rated 2.94 and Age group 4 (i.e. born between 05.01.69 and 16.02.77) rated 2.52.

While both statistically significant results were connected with high ratings on behalf of Age group 2 there are no sufficiently systematic biases to draw any generalisable conclusions of the impact of age on frequency of scanning attention to particular types of information.

Industry effect on frequency of attention to environmental information types

The ANOVA test conducted showed that industry had a significant effect on the frequency of attention paid to four types of environmental information: macro level economic information ($F_{(3,322)} = 4.474$, $p = 0.004$); major business leader commentaries ($F_{(3,322)} = 2.713$, $p = 0.045$); management techniques ($F_{(3,323)} = 3.043$, $p = 0.029$); and regulatory, governmental, and legislative information ($F_{(3,323)} = 3.434$, $p = 0.017$). However the conservative post-hoc Tukey tests revealed only significant differences between specific means within two information areas: macro level economic information; and regulatory, governmental, and legislative information.

For macro level economic information, the frequency of attention paid by managers in Financial intermediation rated at 4.99 was significantly higher than both managers in Manufacturing rated at 4.00 and managers in Real estate, renting, and business activities rated at 4.30. The Tukey post-hoc comparison test confirmed that these differences were significant with a p statistic of 0.003 and 0.037 respectively. A finding to emerge from this analysis is that managers in Financial intermediation pay the most frequent attention to macro level economic information above any other industry. This may be considered consistent with expectations that managers in the financial services industry would need to access economic related information in order to effectively strategise and operate.

For regulatory, governmental, and legislative information, the frequency of attention paid by managers in Financial intermediation rated a 4.61 was significantly higher than that achieved by managers in Real estate, renting, and business activities rated at 4.02. This was confirmed in a Dunnett T3 post-hoc comparison in which $p = 0.048$. It is interesting to note that the highest rating of frequency of attention to this type of information is made by managers within two highly regulated industries: Financial intermediation rated at 4.61 and Transport, storage, and communication rated at 4.69. In fact, the relative high ratings of frequency of attention by managers in Financial intermediation across the relevant environment information types indicates that these managers are sensitive to environmental changes and likely to pay more frequent attention to more types of information than managers in other industries.

The conservative post-hoc comparison tests did not identify statistically significant differences in frequency of attention within the two areas of major business

commentary and management techniques and hence no further analytical comments follow.

Cross-functional experience effect on frequency of attention to environmental information types

The ANOVA test results showed that cross-functional experience had a significant effect on the frequency of attention paid to three types of environmental information: emerging technologies with potential to impact business ($F_{(2,388)} = 5.128$, $p = 0.006$); information about your prior employer company (ies) ($F_{(2,361)} = 5.436$, $p = 0.005$); and spending priorities of other companies ($F_{(2,381)} = 3.634$, $p = 0.027$).

Of these three areas the most significant for further analysis was emerging technologies with potential to impact business as this area was ninth overall in terms of frequency of attention. The other two areas, information about your prior employer company(ies) and spending priorities of other companies were ranked fifteen and fourteen respectively. For emerging technologies with potential to impact business, managers with no cross-functional experience rated 4.37 and paid significantly more attention to this area than did managers with 2 or more functional areas of experience who rated 3.74. This significant difference was confirmed in a Tukey post-hoc comparison test in which $p = 0.004$. This may be a function of experience in that those with less cross-functional experience are more orientated to identify new and emerging technologies.

For the area of prior employer company(ies), managers with no cross-functional experience paid significantly more attention to this type of information than both managers who had worked in 1 other functional area and managers who had worked in 2 or more functional areas. These results were confirmed in a Dunnett T3 post-hoc comparison test which reported $p = 0.009$ and 0.043 respectively. Similarly, for information on spending priorities of other companies, it was managers with no cross-functional experience that paid the most attention; in this case they paid significantly more attention than managers with 2 or more functional areas of experience. This significant difference was confirmed in a Tukey post-hoc comparison test in which $p = 0.036$.

In all of the above cases, it was managers with no cross-functional experience that paid more frequent attention relative to managers with more cross-functional experience. This does indicate a trend and suggests either less experience of this sort is positively related to an increased degree of scanning or that the increased degree of scanning results from limiting scanning along singular functional lines only, leaving more available time to direct attention to environmental information.

MBA status on frequency of attention to environmental information types

Independent samples t tests showed that MBA status had a significant effect on the frequency of attention paid to two areas of environmental information: management techniques information ($t = -2.679$, $df = 392$, $p = 0.008$) and information about your current company ($t = -2.800$, $df = 216$, $p = 0.006$). The results showed that Non-MBA

status managers who rated 4 paid significantly more attention to management techniques information than did MBA graduate managers who rated 3.51. This may reflect a view by MBA graduate managers that they are adequately versed in management techniques as a result of their formal management training. It may also reflect that Non-MBAs actively seek out management technique information to fill a perceived gap in their skill set and will actively seek out alternative sources of ideas to help problem solve.

The other statistically significant difference that emerged was that Non-MBA status managers, who rated 6.06, paid more attention to information about your current company than MBA graduate managers, who rated 5.66 ($t = -2.800$, $df = 216$, $p = 0.006$). Again, a reflection of the impact of formal training may result in MBA managers focusing less on information that can ultimately be internally sourced to other types of information external to the organisation such as competitor and customer information.

Scanning mode effect on frequency of attention to environmental information types

The ANOVA tests performed showed that scanning mode had a significant effect on the frequency of attention paid to three types of environmental information: joint venture or alliance partners ($F_{(3,363)} = 2.808$, $p = 0.040$); spending priorities of other companies ($F_{(3,372)} = 4.661$, $p = 0.003$); and competitor companies ($F_{(3,376)} = 4.320$, $p = 0.005$). Of these areas, it is worth keeping in mind that “competitor companies” was relatively the most important area for analysis. It was ranked fifth of fifteen environmental information areas in terms of frequency of attention, while joint venture or alliance partner information was ranked eleven of fifteen and spending priorities of other companies ranked just fourteen of fifteen.

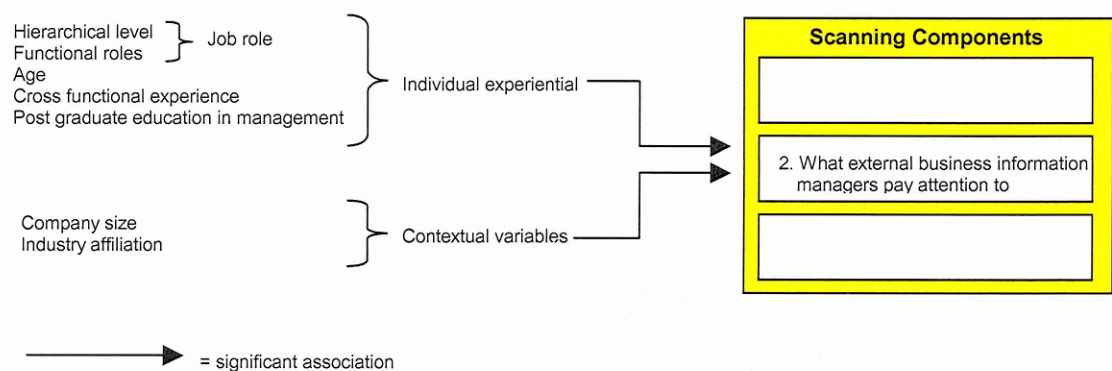
For competitor company information, much more attention is directed to this via the formal search mode rated at 4.95 than conditioned viewing rated at 4.25. This significant difference was confirmed in the Tukey post-hoc comparison test in which $p = 0.004$. The ratings for undirected viewing and information search were also lower than formal mode at 4.36 and 4.44 respectively. Given the typical difficulty of obtaining valid and detailed competitor information, it is to be expected that the more co-ordinated and organised the task supported by dedicated allocated resources, the greater the frequency of viewing such information.

Similarly with information of spending priorities of other companies, it is difficult information to obtain in the absence of a formalised approach and support resources. Hence, it is not unexpected that the frequency of attention paid to spending priorities of other companies is statistically significantly greater through formal search rated at 3.13, than either conditioned viewing rated at 2.57 or informal search rated at 2.40. These differences were confirmed as significant through a Tukey post-hoc comparison test which showed $p = 0.026$ and $p = 0.004$ respectively.

In terms of joint venture or alliance partner information, the conservative post-hoc tests did not identify any statistical significant difference between the mean values to report.

The overall results of the tests of various influencing variables on scanning attention are illustrated in Figure 37 below. The solid arrow reflects that a significant association was detected between the influencing variable and scanning attention. However, when interpreting these results it should be kept in mind that the test conducted was sensitive to detecting significant associations as the scanning attention variable comprised 15 environmental information topics. In some instances there was a significant underlying association between the independent variable and many of the fifteen environmental information types (e.g. size of company had a significant effect on attention paid to 6 of the 15 environmental information types). In other instances, the number of significant associations to emerge were substantially fewer (e.g. functional role was significantly associated with just two types of environmental information). Hence, a thorough analysis of the specific significant relationships to emerge is helpful to understand the results, rather than relying solely on the illustration in Figure 37 below. The analysis of scanning attention and influences was also extended through reviewing the associations between various influencing variables and the key underlying components of scanning attention, as discussed in Section 7.2.7, Scanning Attention Components.

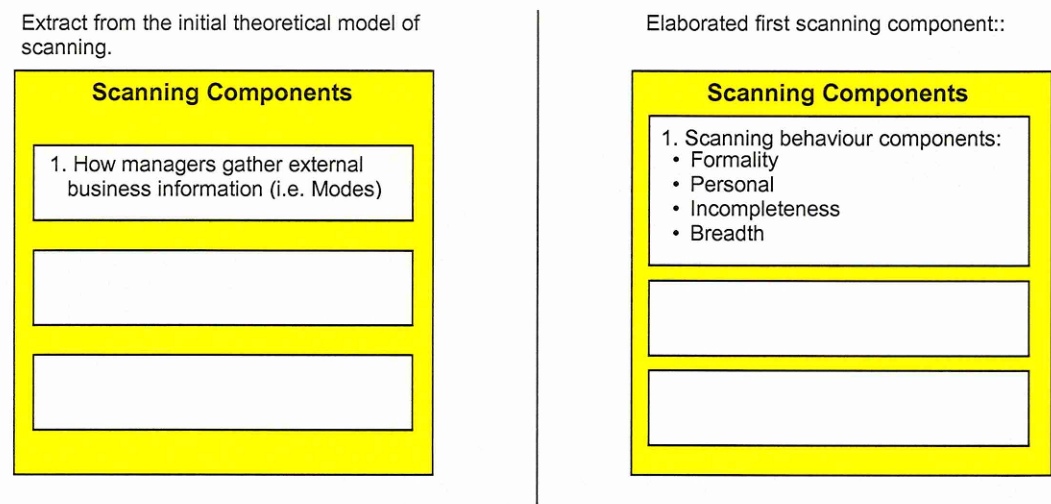
Figure 37: Scanning attention and influences.



7.2.5 Scanning Behaviour Components

The Principal Components Analysis conducted on the forty four scanning behaviour items (i.e. responses to Q11 and Q12 of the Scanning Behaviour Survey) resulted in identifying four significant scanning behaviour components: *formality*, *personal*, *incompleteness*, and *breadth*. For details of how the components were derived, and the cross-validation of these components from one half of the sample to the other half of the sample, refer to Section 6.2.5. These four scanning behaviour components are represented in Figure 38 below. On the left hand side of the figure is an extract from the initial theoretical model, presented in Figure 11, showing the first scanning component which is concerned with how managers gather external business information. On the right hand side of the figure is the elaborated model which comprises the four scanning behaviour components.

Figure 38: Scanning behaviour components.



Based on these four scanning behaviour components, four corresponding scanning behaviour scales were derived. These four scales were then used in a multivariate analysis to determine whether certain independent variables were significantly related to each scale. The results of this analysis are as follows.

Multivariate analysis of factors that might influence key components of scanning behaviour

An analysis was undertaken for the effect of the key independent variables identified in prior scanning studies (i.e. hierarchical level, functional roles, age, cross functional experience, post graduate education in management, company size, industry affiliation, and strategy process) on the key scanning behaviour components labelled *formality*, *personal*, *incompleteness*, and *breadth*. The technique adopted was multiple regression. This technique is often useful to predict the outcome variable for a new sample of data. In addition, multiple regression is useful to assess how well the dependent variable can be explained by knowing the value of the independent variables and to identify which subset from many measures is most effective for estimating the dependent variable.

A summary of the initial coding for each of the independent variables is outlined in Table 68 below. Some further recoding of the independent variables was necessary. Specifically, the functional role and industry categorisation variables were recoded as dummy variables prior to conducting the multiple regression computations. Given that the sample size in this research was reasonably large it was possible to use multiple regression to analyse this data (Asher, 1983).

Table 68: Initial coding for independent variables.

Independent variable:	Initial coding:
Hierarchy	1 = CEO/MD level 2 = 2 or 3 levels below CEO 3 = 4 levels or more below CEO
Functional roles *	1 = General management 2 = Business development 3 = Operations 4 = Support
Age	1 = 1941 to 1961 2 = 1961 – 1966 3 = 1966 – 1969 4 = 1969 – 1977
Cross-functional experience	1 = No past experience 2 = Experience in 1 other functional area 3 = Experience in 2 or more other functional areas
Post graduate education in management	1 = MBA graduate 0 = Non-MBA graduate
Company size	1 = Revenues up to £10m 2 = Revenues between £11m and £100m 3 = Revenues greater than £101m
Industry *	1 = Manufacturing 2 = Transport, storage, & communication 3 = Financial intermediation 4 = Real estate, renting, & business
Strategy visionary process	1 = Low 2 = Medium 3 = High
Strategy emergent process	1 = Low 2 = Medium 3 = High
Strategy planning process	1 = Low 2 = Medium 3 = High

* Subsequently coded into dummy variables.

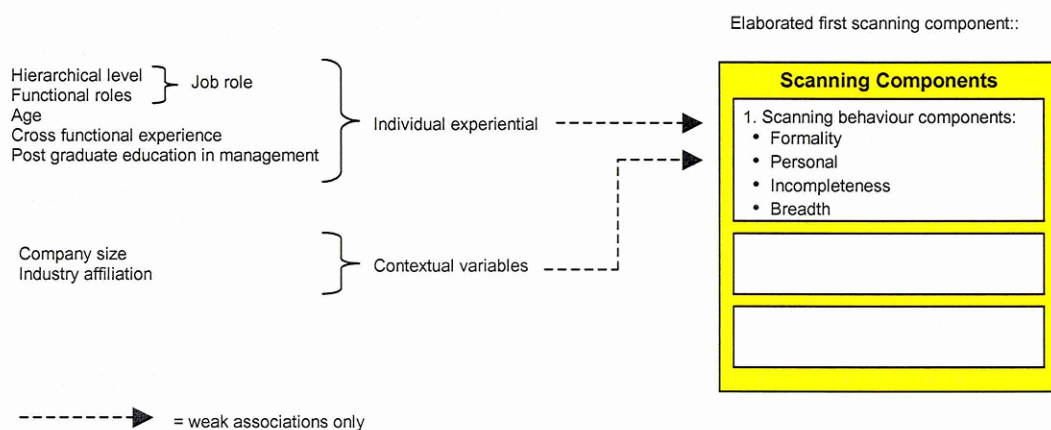
The initial multiple regression included the independent variables of hierarchy, functional roles, age, cross-functional experience, post graduate education in management, company size, and industry categorisation. A separate analysis and commentary on the relationship between strategy process (visionary, emergent, and planning) and scanning behaviour characteristics is made below. The first multiple regression calculation was conducted on the dependent variable labelled *formality*. The independent variables were input into the multiple regression computation using the straightforward enter method in the order outlined in the beginning of this paragraph above. The multiple $R^2 = 0.094$; $F_{(13, 331)} = 2.629$, $p < 0.05$. The multiple R^2 reflected

that knowledge of the independent variables input into this computation explained only 9% of the variability of the scanning characteristic of *formality*. The Adjusted R Square, a more conservative estimate of the collective explanatory power of the independent variables, was just 0.058. Of the thirteen independent coefficients tested, three were significant. First, age was positively predictive of *formality* ($\beta = 0.182$, $p < 0.05$). This result suggests that the younger managers will be more formal in their approach to scanning. Second, cross functional experience was negatively predictive of *formality* ($\beta = -0.142$, $p < 0.05$). This suggests that managers with less cross-functional experience are more formal scanners. Third, MBA status was positively predictive of *formality* ($\beta = 0.182$, $p < 0.05$). For a summary of the Beta coefficients, R^2 , and Adjusted R^2 results from the above multiple regression computations, refer to Appendix O, Summary of multiple regression results.

Insignificant multiple R^2 results emerged when multiple regression computations were done for each of the further three scanning characteristic dependent variables – *personal*, *incompleteness*, and *breadth*. For the dependent variable *personal*, $R^2 = 0.034$; $F_{(13, 329)} = 0.880$, $p = 0.575$. For the dependent variable *incompleteness*, $R^2 = 0.031$; $F_{(13, 330)} = 0.880$, $p = 0.651$. For the dependent variable *breadth*, $R^2 = 0.042$; $F_{(13, 328)} = 1.099$, $p = 0.359$. As the overall R^2 results were so low, and as the multiple R^2 results were not significant, no further reporting of individual coefficients was warranted. For a summary of the Beta coefficients, R^2 , and Adjusted R^2 results from the above multiple regression computations, refer to Appendix O, Summary of multiple regression results.

For representation of the weak associations that emerged through conducting the multiple regression computations of various independent variables on each of the four scanning behaviour components, refer to Figure 39 below.

Figure 39: Scanning behaviour components and influencing variables.



ANOVA tests for strategy processes and scanning behaviour components

A separate set of ANOVA tests and analyses were performed for the independent variables of visionary strategy process, emergent strategy process, and planning strategy process. The first set of ANOVA tests were performed with respect to the dependent variables categorised under scanning characteristics. Of these tests, 5 significant results emerged from the total of 12 ANOVA tests performed. The significant results were as follows. Visionary strategy process had a significant effect on the *formality* scanning characteristic ($F_{(2,375)} = 3.338$, $p = 0.037$). Levene's $p = 0.212$ and hence equality of variance was assumed. The Tukey post-hoc comparison test identified that organisations with high adoption of visionary strategy processes were significantly more formal in their scanning effects than organisations with low adoption of visionary strategy processes ($p = 0.039$). Also, visionary strategy process had a significant effect on the *breadth* scanning characteristic ($(F_{(2,377)} = 3.938$, $p = 0.020$). Levene's $p = 0.466$ and hence equality of variance was assumed. The Tukey post-hoc comparison test identified that organisations with low adoption of visionary strategy processes were significantly less broad in scanning scope than organisations with high adoption of visionary strategy processes ($p = 0.039$). For details of the mean scanning behaviour scale scores for each visionary strategy group (i.e. 1 = low adoption, 2 = moderate adoption, 3 = high adoption), refer to the below Table 69.

Table 69: Scanning behaviour scale scores by Visionary Strategy groups: Descriptive statistics.

		N	Mean	Std. Deviation	Std. Error
SBSCALE1: FORMALITY	1.00	88	3.8864	1.10179	.11745
	2.00	82	4.0183	1.06268	.11735
	3.00	208	4.2416	1.18602	.08224
	Total	378	4.1104	1.14812	.05905
SBSCALE2: PERSONAL	1.00	88	4.5758	1.10117	.11739
	2.00	80	4.5333	.88526	.09898
	3.00	209	4.7273	1.03854	.07184
	Total	377	4.6508	1.02440	.05276
SBSCALE3: INCOMPLETENESS	1.00	91	5.3297	1.26759	.13288
	2.00	81	5.2099	1.15614	.12846
	3.00	208	5.4471	1.16805	.08099
	Total	380	5.3684	1.19080	.06109
SBSCALE4: BREADTH	1.00	91	4.8828	.90863	.09525
	2.00	82	4.9228	.98869	.10918
	3.00	207	5.1610	.86203	.05992
	Total	380	5.0430	.90872	.04662

For emergent strategy processes, one significant ANOVA result emerged. There was a significant effect of emergent strategy process on the scanning characteristic of *breadth* ($(F_{(2,376)} = 4.002$, $p = 0.019$). Levene's $p = 0.390$ and hence equality of variance was assumed. The Tukey post-hoc comparison test identified that organisations with low

adoption of emergent strategy processes were less broad in scanning scope than organisations with high adoption of emergent strategy processes ($p = 0.016$). For details of the mean scanning behaviour scale scores for each Emergent strategy group (i.e. 1 = low adoption, 2 = moderate adoption, 3 = high adoption), refer to the below Table 70.

Table 70: Scanning behaviour scale scores by Emergent Strategy groups: Descriptive statistics.

		N	Mean	Std. Deviation	Std. Error
SBSCALE1: FORMALITY	1.00	137	4.0091	1.14058	.09745
	2.00	60	4.1417	1.08570	.14016
	3.00	180	4.1764	1.17757	.08777
	Total	377	4.1101	1.14962	.05921
SBSCALE2: PERSONAL	1.00	137	4.5450	1.02332	.08743
	2.00	61	4.6011	.94442	.12092
	3.00	178	4.7453	1.04934	.07865
	Total	376	4.6489	1.02516	.05287
SBSCALE3: INCOMPLETENESS	1.00	138	5.3152	1.23967	.10553
	2.00	61	5.1311	1.14710	.14687
	3.00	180	5.4889	1.16148	.08657
	Total	379	5.3681	1.19235	.06125
SBSCALE4: BREADTH	1.00	137	4.8686	.87294	.07458
	2.00	62	5.1022	.80660	.10244
	3.00	180	5.1519	.95349	.07107
	Total	379	5.0413	.90935	.04671

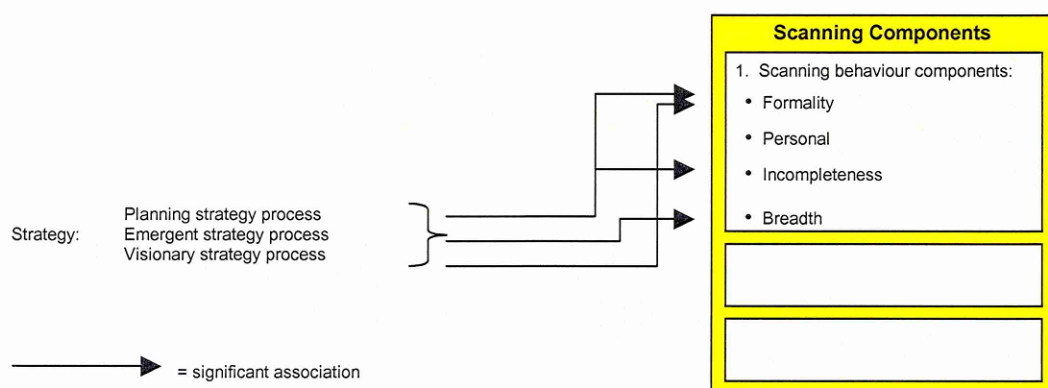
For planning strategy processes, there were two significant ANOVA results. First, there was a significant effect of planning strategy processes on the *formality* scanning characteristic ($(F_{(2,375)} = 4.009, p = 0.019)$). Levene's $p = 0.199$ and hence equality of variance was assumed. The Tukey post-hoc comparison test identified that organisations with a high adoption of planning strategy processes were significantly more formal scanners than organisations with low adoption of planning strategy processes ($p = 0.014$). Second, there was a significant effect of planning strategy processes on *incompleteness* scanning characteristic ($(F_{(2,377)} = 7.844, p < 0.001)$). Levene's $p = 0.368$ and hence equality of variance was assumed. The Tukey post-hoc comparison tests showed that respondents in organisations with a low adoption of planning strategy processes had a significantly higher sense of incompleteness than did both respondents in organisations with a medium level of adoption of planning strategy processes ($p = 0.003$) and respondents in organisations with a high level of adoption of planning strategy processes ($p = 0.001$). For details of the mean scanning behaviour scale scores for each Planning Strategy group (i.e. 1 = low adoption, 2 = moderate adoption, 3 = high adoption), refer to the below Table 71.

Table 71: Scanning behaviour scale scores by Planning Strategy groups: Descriptive statistics.

		N	Mean	Std. Deviation	Std. Error
SBSCALE1: FORMALITY	1.00	103	3.8762	1.11247	.10961
	2.00	127	4.0925	1.10814	.09833
	3.00	148	4.2889	1.18261	.09721
	Total	378	4.1104	1.14812	.05905
SBSCALE2: PERSONAL	1.00	103	4.6828	1.12253	.11061
	2.00	127	4.5039	1.00428	.08912
	3.00	147	4.7551	.95987	.07917
	Total	377	4.6508	1.02440	.05276
SBSCALE3: INCOMPLETENESS	1.00	105	5.7524	1.14380	.11162
	2.00	127	5.2402	1.14928	.10198
	3.00	148	5.2061	1.20505	.09905
	Total	380	5.3684	1.19080	.06109
SBSCALE4: BREADTH	1.00	104	5.0481	.99124	.09720
	2.00	130	5.0282	.85265	.07478
	3.00	146	5.0525	.90184	.07464
	Total	380	5.0430	.90872	.04662

Overall, the ANOVA tests and analysis performed between strategy processes (i.e. visionary, planning, and emergent) and scanning behaviour scales resulted in four significant ANOVA results. These are represented in Figure 40 below. There were only two significant relationships to emerge that were consistent with *a priori* expectations. To recap, the significant ANOVA results that did emerge as expected were emergent strategy processes and *breadth*, and planning strategy processes and *formality*. This is in contrast to the non *a priori* expected significant relationships that emerged between visionary strategy process and *formality* and visionary strategy process and *breadth*. Possibilities to expand this aspect of the research to further consider the link between strategy processes and scanning behaviour are elaborated on in Section 8.4, Implications for Further Studies.

Figure 40: Strategy process and scanning behaviour components.



7.2.6 Technology Influence

A significant analytical outcome is the relative overall ranking of the frequency of use of each of the four major sources of information of personal networks of individuals outside your company; internet sources including search engines, company websites, email information subscription services; traditional mediums such as television, radio, newspaper, business magazines etc.; and company personnel such as superiors, peer, and subordinates.

Ranked as the highest referenced source were internet sources including search engines, company websites, and email information subscription services (mean score of 5.77). The next most frequently referenced sources in order were company personnel such as superiors, peers, subordinates (mean of 5.47); traditional mediums such as television, radio, newspaper, business magazines etc. (mean of 5.40); and personal networks of individuals outside the company (mean of 4.66). This data provides support for the role of the internet or IP technologies as a highly utilised source of information for senior managers. It is also interesting that the next highest ranked source in terms of frequency of use was company personnel; this was not a direct source of information from the external environment on events and trends yet was ranked second in frequency ratings. A more direct source – television, radio, newspaper, business magazines etc. – ranked third overall. While the least frequently ranked source, personal networks outside the company ranked last in fourth place. This last source, personal networks, arguably has the potential to provide “rich” information concerning external trends and events and yet is the lowest ranked of the four sources considered. Perhaps this low ranking reflects not so much the expected quality of the information that could be obtained through this source but instead the additional effort and difficulty of actively networking with external personal networks.

A closer examination of the results provide some interesting analysis. Refer to the below Table 72, Frequency of use of sources.

Table 72: Frequency of use of sources.

Personal networks of individuals outside your company														
1		2		3		4		5		6		7		
Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	
10	2.6%	35	9.1%	44	11.4%	61	15.8%	106	27.5%	96	24.9%	33	8.6%	

Internet sources including search engines, company websites, email information subscription services														
1		2		3		4		5		6		7		
Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	
2	.5%	8	2.1%	14	3.6%	26	6.7%	86	22.3%	118	30.6%	132	34.2%	

Traditional mediums such as television, radio, newspaper, business magazines etc.														
1		2		3		4		5		6		7		
Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	
2	.5%	8	2.1%	29	7.5%	40	10.4%	101	26.2%	126	32.6%	80	20.7%	

Company personnel such as superiors, peers, subordinates														
0		1		2		3		4		5		6		7
Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count
1	.3%	3	.8%	5	1.3%	14	3.7%	40	10.4%	108	28.2%	143	37.3%	69
														18.0%

According to the above table, Internet sources including search engines, company websites, and email information subscription services are by far the most frequently referenced source; 34.2% of senior managers are using the internet at least once a day to access information about event and trends in the external environment. This is in contrast to 20.7% of senior managers who refer daily to the combined media of television, radio, newspaper, business magazines etc. Much lower daily reference is made of company personnel such as superiors, peers, and subordinates at 18% and personal networks of individuals outside of the company are referenced less still on a daily basis at 8.6%. This is a significant result and positions the internet as the leading media in terms of pure frequency of reference in the work routines of senior managers. When analysing which sources are referenced approximately once every two days or so (i.e. no. 6 of the frequency rating scale) the results are more even across the four different sources. At this frequency of reference, 37.2% of senior managers reference company personnel such as superiors, peers, and subordinates; 32.6% of senior managers reference traditional mediums such as television, radio, newspaper, business magazines etc.; 30.6% reference internet sources including search engines, company websites, and email information subscription services; followed lastly by 24.9% of senior managers who reference personal networks of individuals outside the company.

At frequency point 5, i.e. “once every week or so”, the percentage of senior managers adopting this rate of reference across the four sources are similar at approximately mid 20% - personal networks of individuals outside of your own company were 27.5%; internet sources including search engines, company websites, email information subscription services were 22.3%; traditional mediums such as television, radio, newspaper, business magazines etc. were 26.2%; and company personnel such as superiors, peers, and subordinates were 28.2%.

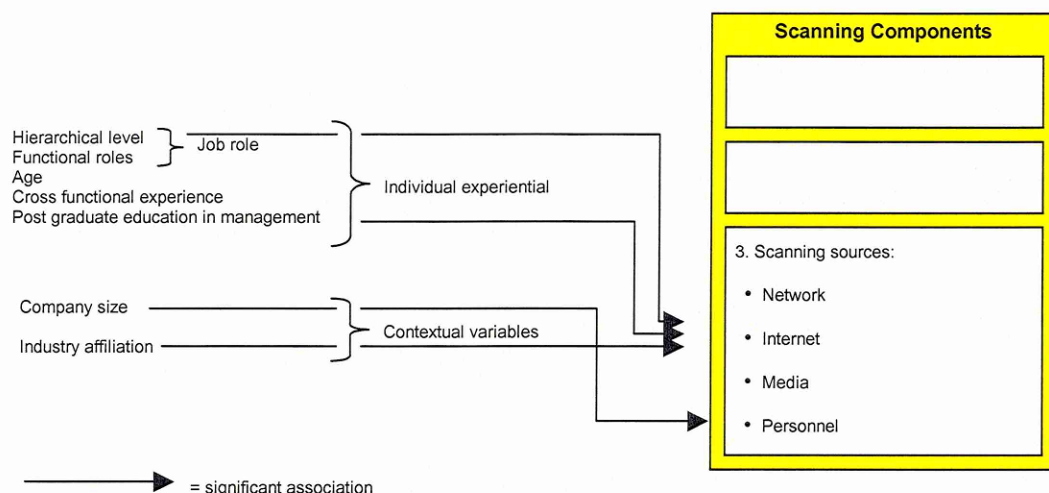
The highlights of the above analysis were identifying the leading role that the internet plays as the most frequently referenced source for external business environment information while noting that each of the four sources played more significant and a

more equally weighted role as information sources are referenced less frequently such as every week or so.

In terms of influencing factors on use of sources, an ANOVA test identified that size of company was significantly associated with frequency of use of information sourced from company personnel such as superiors, peers, and subordinates ($F_{(2,366)} = 4.358$, $p = 0.013$). Levene's $p = 0.101$ and therefore equality of variance was assumed. The significant result was that senior managers in small companies utilised the source of company personnel much less than did senior managers in medium sized companies ($p = 0.029$) or large size companies ($p = 0.018$). Intuitively this is an expected result as the number of personnel to source information is obviously less in a smaller organisation and therefore in order to obtain valuable information from the external business environment the other three major sources would be need to more highly utilised.

According to the ANOVA test results, hierarchical level was significantly associated with the use of internet and internet related sources ($F_{(2,373)} = 4.063$, $p = 0.018$). Levene's $p = 0.015$ and therefore equality of variance was not assumed. Specifically, CEOs and MDs used internet and internet related sources significantly less frequently than managers at levels four (4) levels and below the CEO ($p = 0.032$). The degree of use of the internet was also significantly associated with scanning mode ($F_{(3,376)} = 3.652$, $p = 0.013$), industry ($F_{(3,317)} = 3.727$, $p = 0.012$), and MBA status ($t = 2.490$, $df = 384$, $p = 0.013$). The specific comparative tests highlighted that MBA graduates used the internet significantly more than Non-MBA graduates ($p = 0.013$). It is interesting to note that the major points of differentiation, in terms of sources used by senior managers, related to use of the internet. There was very little difference in the pattern of usage of the other three sources – personal networks, traditional media, and company personnel – regardless of hierarchical level, scanning mode, functional role, age, industry membership, cross-functional experience, and MBA status. Refer to Figure 41 below for a summary representation of the significant associations uncovered.

Figure 41: Scanning sources and influencing variables.



Multivariate analysis of factors that might influence key components of scanning sources

A further analysis was undertaken for the effect of the key independent variables identified in prior scanning studies (i.e. hierarchical level, functional roles, age, cross functional experience, post graduate education in management, company size, industry affiliation, and strategy process) on the key scanning sources labelled *network*, *internet*, *media*, and *personnel*. The technique adopted was multiple regression. A summary of the coding for each of the independent variables is outlined in Table 68 in Section 7.2.5, Scanning Behaviour Components.

The initial multiple regression computation included the independent variables of hierarchy, functional roles, age, cross-functional experience, post graduate education in management, company size, and industry categorisation. A separate analysis and commentary on the relationship between strategy process (visionary, emergent, and planning) and scanning sources is made below. The independent variables were input into the multiple regression computation using the straightforward enter method in the order outlined in the beginning of this paragraph. The results were as follows. For the dependent variable *network*, $R^2 = 0.045$; $F_{(13,331)} = 1.203$, $p = .275$. For the dependent variable *internet*, $R^2 = 0.068$; $F_{(13,332)} = 1.877$, $p < 0.05$. Only two coefficients were significantly related to *internet*. First, hierarchy was positively predictive of internet use ($\beta = 0.153$, $p < 0.05$). This provides support that the more junior management use the internet more extensively than senior management. This result is consistent with the outcome of the prior ANOVA test between hierarchy and *internet*. Second, membership in the industry category of Real estate, renting, and business was positively predictive of internet usage ($\beta = 0.173$, $p < 0.05$). This may reflect the high percentage of consultants and professional service providers who are classified into the industry category of Real estate, renting, and business. These managers are likely to engage in above average levels of information management and hence internet usage.

For the dependent variable *media*, $R^2 = 0.031$; $F_{(13, 332)} = 0.810$, $p = 0.649$. For the dependent variable *personnel*, $R^2 = 0.052$; $F_{(13, 329)} = 1.377$, $p = 0.168$.

The low R^2 results suggested that the independent variables tested accounted for only a negligible amount of variability in the dependent variables concerned. For a summary of the Beta coefficients, R^2 , and Adjusted R^2 results from the above multiple regression computations, refer to Appendix O, Summary of multiple regression results.

ANOVA tests for strategy processes and scanning sources

A separate set of ANOVA tests and analyses were performed for the independent variables of visionary strategy process, emergent strategy process, and planning strategy process. A set of ANOVA tests were also performed on the effect of strategy processes on scanning sources. Two significant results emerged. First, there was a significant effect of emergent strategy process on *network* information ($(F_{(2,380)} = 6.404, p = 0.002)$). Levene's $p = 0.012$ and therefore equality of variance was not assumed. The Dunnett T3 post-hoc comparison test showed that organisations with low adoption of emergent strategy process used *network* sourced information significantly less than organisations with high adoption of emergent strategy process ($p = 0.002$). This relationship was the only *a priori* expectation of relationships between strategy processes and sources to be realised. For details of the scanning sources scores for each Emergent Strategy group (i.e. 1 = low adoption, 2 = moderate adoption, 3 = high adoption), refer to the below Table 73.

Table 73: Scanning sources scale scores by Emergent Strategy groups: Descriptive statistics.

		N	Mean	Std. Deviation	Std. Error
Personal networks of individuals outside your company	1.00	139	4.32	1.646	.140
	2.00	62	4.61	1.453	.184
	3.00	182	4.92	1.412	.105
	Total	383	4.65	1.529	.078
Internet sources including search engines, company websites, email information subscription services	1.00	139	5.65	1.295	.110
	2.00	62	5.69	1.249	.159
	3.00	182	5.90	1.219	.090
	Total	383	5.78	1.254	.064
Traditional mediums such as television, radio, newspaper, business magazines etc.	1.00	139	5.42	1.307	.111
	2.00	62	5.19	1.316	.167
	3.00	182	5.46	1.281	.095
	Total	383	5.40	1.296	.066
Company personnel such as superiors, peers, subordinates	1.00	138	5.41	1.206	.103
	2.00	62	5.60	1.047	.133
	3.00	180	5.52	1.189	.089
	Total	380	5.49	1.172	.060

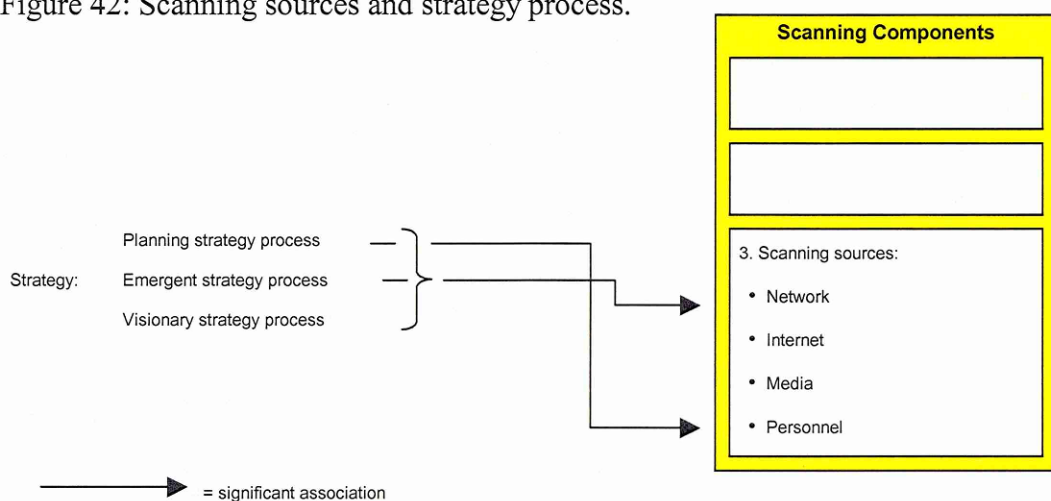
Second, there was a significant effect of planning strategy process on company personnel sourced information ($(F_{(2,378)} = 6.049, p = 0.003)$). Levene's $p = 0.062$ and therefore equality of variance was assumed. The Tukey post-hoc comparison test showed that organisations with high adoption of planning strategy process sourced information from personnel significantly more than did organisations with low adoption of planning strategy process ($p = 0.002$). For details of the scanning sources scores for each Planning Strategy group (i.e. 1 = low adoption, 2 = moderate adoption, 3 = high adoption), refer to the below Table 74.

Table 74: Scanning sources scale scores by Planning Strategy groups: Descriptive statistics.

		N	Mean	Std. Deviation	Std. Error
Personal networks of individuals outside your company	1.00	106	4.92	1.580	.153
	2.00	130	4.47	1.495	.131
	3.00	148	4.64	1.504	.124
	Total	384	4.66	1.528	.078
Internet sources including search engines, company websites, email information subscription services	1.00	106	5.82	1.301	.126
	2.00	130	5.70	1.249	.110
	3.00	148	5.80	1.234	.101
	Total	384	5.77	1.256	.064
Traditional mediums such as television, radio, newspaper, business magazines etc.	1.00	106	5.29	1.434	.139
	2.00	130	5.33	1.338	.117
	3.00	148	5.55	1.139	.094
	Total	384	5.40	1.295	.066
Company personnel such as superiors, peers, subordinates	1.00	105	5.15	1.378	.135
	2.00	129	5.53	1.024	.090
	3.00	147	5.67	1.149	.095
	Total	381	5.48	1.193	.061

The two significant associations to emerge between strategy process and scanning sources are represented in Figure 42 below.

Figure 42: Scanning sources and strategy process.

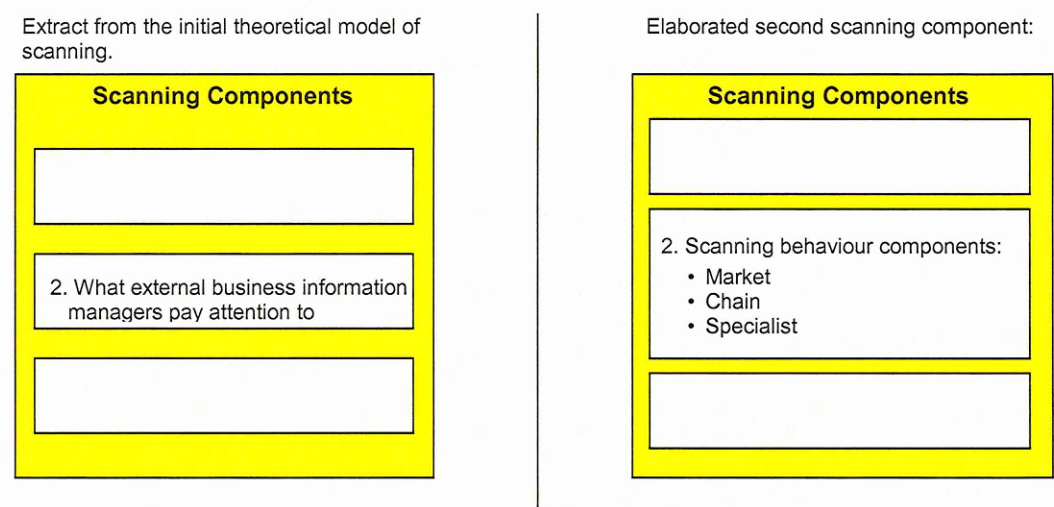


Overall, the ANOVA tests and analysis performed between strategy processes (i.e. visionary, planning, and emergent) and scanning sources did not indicate sufficiently strong relationships consistent with *a priori* expectations upon which to draw substantive insights. Possibilities to expand this aspect of the research to further consider the link between planning strategy processes and scanning sources are elaborated on in Section 8.4, Implications for Further Studies.

7.2.7 Scanning Attention Components

The Principal Components Analysis conducted on the fifteen scanning behaviour items (i.e. responses to Q8 of the Scanning Behaviour Survey) resulted in identifying three significant scanning attention components: *market*, *chain*, and *specialist*. For details of how the components were derived, and the cross-validation of these components from one half of the sample to the other half of the sample, refer to Section 6.2.7, Scanning Attention Components. These three scanning attention components are represented in Figure 43 below. On the left hand side of the figure is an extract from the initial theoretical model, presented in Figure 11, showing the second scanning component which concerned what external business information managers pay attention to. On the right hand side of the figure is the elaborated model which comprises the three scanning attention components.

Figure 43: Scanning attention components.



Based on these three scanning attention components, three corresponding scanning attention scales were derived. These three scales were then used in a multivariate analysis to determine whether certain independent variables were significantly related to each scale. The results of this analysis are as follows.

Multivariate analysis of factors that might influence key components of scanning attention

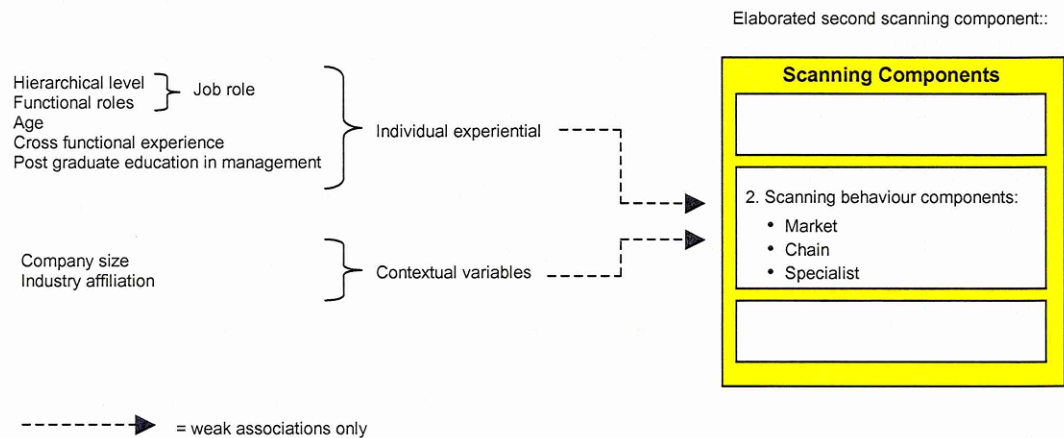
An analysis was undertaken for the effect of the key independent variables identified in prior scanning studies (i.e. hierarchical level, functional roles, age, cross functional experience, post graduate education in management, company size, industry affiliation,

and strategy process) on the key scanning attention components attention labelled *market*, *chain*, and *specialist*. The technique adopted was multiple regression. A summary of the coding for each of the independent variables is outlined in the previous Table 68.

The initial multiple regression computation included the independent variables of hierarchy, functional roles, age, cross-functional experience, post graduate education in management, company size, and industry categorisation. A separate analysis and commentary on the relationship between strategy process (visionary, emergent, and planning) and scanning attention characteristics is made below. The first multiple regression calculation was conducted on the dependent variable labelled *market*. The independent variables were input into the multiple regression computation using the straightforward enter method in the order outlined in the beginning of this paragraph. Low R^2 results were computed once again. For the dependent variable *market*, $R^2 = 0.070$; $F_{(13,334)} = 1.922$, $p < 0.05$. Two coefficients were significantly related to *market*. First, cross functional experience was negatively predictive of attention paid to *market* ($\beta = -0.112$, $p < 0.05$). This suggests that managers with less cross-functional experience will pay more attention to *market* information. This may reflect that managers who work within a single function are clear on what information in the market may be of use to them, and balance their inward and outward focus accordingly. Second, membership in the financial intermediation industry was positively predictive of attention paid to *market* ($\beta = 0.233$, $p < 0.05$). This is consistent with expectations that managers in the financial services industry need to frequently access economic related information and review this information in great depth in order to effectively strategise and operate. The performance of financial service managers may be especially sensitive to environmental changes and they are therefore more likely to pay more frequent attention to types of market related information than would managers in other industries. For the dependent variable *chain*, $R^2 = 0.029$; $F_{(13,318)} = 0.741$, $p = 0.722$. For the dependent variable *specialist*, $R^2 = 0.055$; $F_{(13,336)} = 1.493$, $p = 0.118$. These results suggested that the independent variables tested accounted for only a negligible amount of variability in the dependent variables concerned.

For a summary of the Beta coefficients, R^2 , and Adjusted R^2 results from the above multiple regression computations, refer to Appendix O, Summary of multiple regression results. For representation of the weak associations that emerged through conducting the multiple regression computations of various independent variables on each of the three scanning attention components, refer to Figure 44 below.

Figure 44: Scanning attention components and influencing variables.



ANOVA tests for strategy processes and scanning attention components

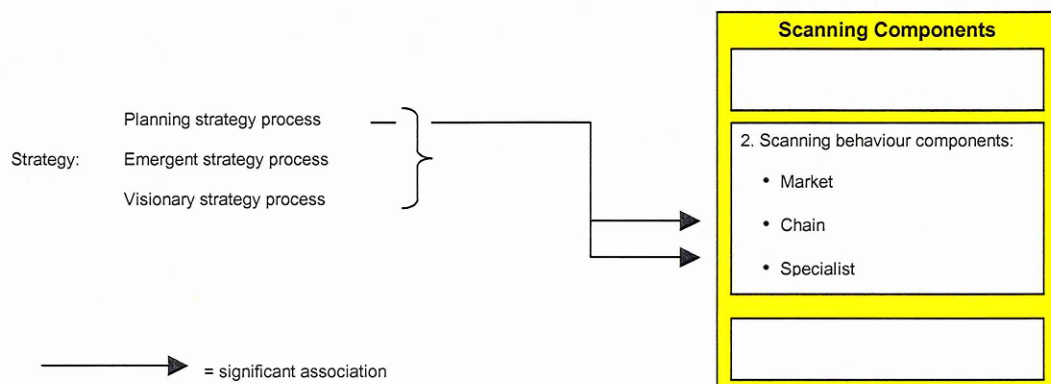
A separate set of ANOVA tests and analyses were performed for the independent variables of visionary strategy process, emergent strategy process, and planning strategy process. ANOVA tests for the effect of strategy processes on the three key areas of scanning attention – *market*, *chain*, and *specialist* – produced two significant results. Both significant results concerned the planning strategy process. There was a significant effect of planning strategy process on the attention paid to *chain* information ($(F_{(2,358)} = 4.114, p = 0.017)$). Levene's $p = 0.431$ and therefore equality of variance was assumed. The Tukey post-hoc comparison test showed that organisations with high adoption of planning strategy process paid significantly more attention to *chain* information than organisations with low adoption of planning strategy process ($p = 0.019$). Further, there was a significant effect of planning strategy process on the attention paid to *specialist* information ($(F_{(2,380)} = 3.173, p = 0.043)$). Levene's $p = 0.207$ and therefore equality of variance was assumed. The Tukey post-hoc comparison test identified that organisations with high adoption of planning strategy process paid significantly more attention to *specialist* information than organisations with low adoption levels ($p = 0.034$). These relationships between planning strategy process and attention paid to both *chain* information and *specialist* information were *a priori* expectations. However, the other *a priori* expectation of a significant relationship between planning strategy process and *market* information was not realised. Overall analytical comments on the significant versus non-significant ANOVA results are made below at the end of this section. For details of the scanning attention scale scores for each Planning Strategy group (i.e. 1 = low adoption, 2 = moderate adoption, 3 = high adoption), refer to the below Table 75.

Table 75: Scanning attention scale scores by Planning Strategy groups: Descriptive statistics.

		N	Mean	Std. Deviation	Std. Error
ATTSC1: MARKET	1.00	105	4.4921	1.28110	.12502
	2.00	127	4.6010	1.11194	.09867
	3.00	149	4.7539	1.22130	.10005
	Total	381	4.6308	1.20484	.06173
ATTSC2: CHAIN	1.00	98	3.6020	1.36865	.13825
	2.00	122	4.0137	1.31069	.11866
	3.00	141	4.0662	1.25117	.10537
	Total	361	3.9224	1.31521	.06922
ATTSC3: SPECIALIST	1.00	105	4.0000	1.27350	.12428
	2.00	129	4.2506	1.10870	.09762
	3.00	149	4.3714	1.12742	.09236
	Total	383	4.2289	1.16977	.05977

Overall, the ANOVA tests and analysis performed between strategy processes (i.e. visionary, planning, and emergent) and scanning attention components did not indicate sufficiently strong relationships consistent with *a priori* expectations upon which to draw substantive insights. By way of recap, the significant ANOVA results that did emerge as expected were planning strategy processes and *chain* information, and planning strategy processes and *specialist* information. These are summarised in Figure 45 below. Based on these results, the planning strategy process is the type of strategy process most associated with scanning attention components. Possibilities to expand this aspect of the research to further consider the link between planning strategy processes and scanning behaviour are elaborated on in Section 8.4, Implications for Further Studies.

Figure 45: Strategy process and scanning attention components.



7.2.8 Passive Receipt of Information

The set of tests done on passive receipt of information concerned identifying differences between the frequency of receipt of external business information through informal versus formal sources. Overall, the results showed that the frequency of passive receipt of external business environment information through company personnel was consistently greater via informal channels versus formal channels.

The frequency of formal receipt of external business environment information from superiors was rated 4.08 whereas informal receipt of this information from superiors was rated 4.62. According to a paired t test, this difference was statistically significant ($t = -6.411$, $df = 381$, $p < 0.001$) and set a trend that was repeated when analysing information received from peers and subordinates.

Peers provided information on external events and trends informally at a frequency rate of 5.30; this was significantly higher than the rate of information provided by peers via formal means rated at 4.56 ($t = -10.140$, $df = 384$, $p < 0.001$).

Similarly the frequency of receipt of external business environment information from subordinates was significantly greater through informal than formal means ($t = -7.510$, $df = 371$, $p < 0.001$); frequency of informal receipt was rated 4.62 whereas formal receipt was just 4.04.

Hence, for receipt of information from company personnel – whether that be from superiors, peers, or subordinates – informal means was consistently statistically significantly higher than formal means. This analysis confirmed that on average a senior manager is more likely to first learn of new business environment information through corridor conversations, coffee room remarks, work breaks, and social functions etc. than through formal meetings, market analysis reports, competitor monitor summaries, trend update reports etc. It would seem that the informal communication channel is playing a significant role in organisations to inform senior managers of information about events and trends in the external environment and to generally assist senior managers to meet fulfil their information management roles i.e. role of “manager as monitor”.

These results were in contrast to the frequency of information received from external agents such as consultants, marketing research professionals, and industry experts. In all of these cases the frequency of information received was much higher through formal than informal means. Average frequency of information received from consultants formally was 2.92; this was significantly higher than frequency of informal receipt of 2.51 ($t = 5.589$, $df = 374$, $p < 0.001$). Frequency of formal receipt of business environment information from market researchers was 3.18 which was significantly higher compared to informal receipt frequency rated on average at 2.08 ($t = 13.159$, $df = 373$, $p < 0.001$). Industry experts provided information about environmental events via formal means at a frequency of 4.13 compared to informally at a rate of 2.51; this also reflected a significant difference ($t = 16.372$, $df = 372$, $p < 0.001$). All of the differences between frequency of receipt via formal channels versus informal were statistically significant for information received from consultants, marketing research

professionals, and industry experts. This is perhaps to be expected as contact with the external agents – consultants, researchers, industry expert – is usually accompanied by some sort of formal contract to compensate the agents for their professional services or information provided.

In summary, external information from company personnel is primarily communicated informally versus formally. In terms of frequency, the most regular source of information comes from peers, followed equally by superiors and subordinates. External information from external agents is primarily communicated formally. In terms of frequency, the most regular receipt source of information comes from industry experts, followed by market researchers, and then consultants. Overall, the data confirms the significant role that company personnel play in communicating external business environment information albeit predominantly informally versus formally.

8. Conclusions

8.1 Summary of Contribution

The overriding objective of this research was to provide an updated and more in-depth understanding of the phenomenon of scanning behaviour and the influences upon it. This research was therefore concerned with understanding the way in which senior managers set about gaining information about events and trends in the business environment outside the organisation. Based on a comprehensive review of scanning related literature, insights from conducting in-depth qualitative pilot studies, and data from an extensive survey completed by 394 senior manager survey respondents, an analytical exercise was done to specifically identify the proposed contribution to management researchers and practitioners alike.

All told, 9 specific areas of contribution were identified. Each area and the nature of the contribution is commented on below. This information is ordered by the following findings: scanning is a significant managerial activity; managers scan in different ways; no strong determinants of scanning behaviour emerged; some determinants of scanning attention did emerge; managers use similar sources of information; an elaborated model of scanning emerged; scanning is an embedded managerial routine; effective scanning practices need to utilise embedded scanning behaviour; and organisational alertness, performance, and environmental dynamism considerations.

Scanning is a significant managerial activity

This research confirmed that scanning is a significant behaviour in the sense that senior managers recognise it as a significant activity that is undertaken by them. All of the 394 senior manager respondents to the scanning behaviour survey answered questions without query related to scanning behaviour; this confirmed that the set of scanning activities were familiar to them and commonly understood. By itself, this serves as confirmatory evidence that the role of “manager as monitor” remains a current role performed by senior managers. Recall that scanning was categorised as behaviour that falls within the role of “manager as monitor” – one of the three informational roles (monitor, disseminator, and spokesman) and one of the ten overall managerial roles (figurehead, leader, liaison, monitor, disseminator, spokesman, entrepreneur, disturbance handler, resource allocator, negotiator) (Mintzberg, 1973).

It should be noted that this research is confirmatory of the role of “manager as monitor” in so far as it relates to scanning for information about events and trends in the external business environment i.e. an external perspective. Mintzberg (1973) identified five types of information received by executives that covered both an external and internal perspective; the information categories identified were internal operations, external events, analyses, ideas and trends, and pressures. This research is confirmatory of the role of “manager as monitor” to the extent that it relates to monitoring for external orientated information only.

The second sense in which scanning is a significant current activity is the significant amount of time that managers spend scanning. This was confirmed by analysing the time that senior managers reported they spent scanning each week. The results showed the following statistical averages to be: mean 9.8, median 8, and mode 10. For those senior managers whose predominant mode was formal scanning (i.e. 27% of respondents) the average mean figure was higher at 12.1 hours per week. These figures confirm that a significant portion of managerial time and effort is consumed engaged in scanning behaviour. Assuming an average senior manager works 40 hours per week, the mean figure of 9.8 hours spent scanning per week represents 24.5% of a manager's weekly time. Given that scanning is just one of 10 managerial roles the percentage of time that scanning consumes is proportionately significant.

An effort was made to compare the amount of time spent scanning according to this research with prior pertinent studies that incorporated an analysis of scanning activity. Aguilar (1967) presented a most extensive analysis of the manager's external information. His study, based on interviews and the analysis of critical incidents, outlined "the scanning process", and proceeded to answer three core questions: what external information do managers obtain?, where do managers obtain external information?, and how do managers obtain external information? The output includes a category of information by kind, source, and method of finding (solicited, unsolicited etc.). In addition, the data is broken down for managers at three levels in the hierarchy; in general management, marketing, and technical and other functional areas; in small, medium, and large companies; and for experienced and inexperienced managers. However, despite the extensive nature of this analysis Aguilar (1967) did not provide any data on the actual time that managers scan the business environment.

A review of another 12 major research papers relevant to scanning and interpretation (refer to Appendix I) was done to specifically identify any data on time spent scanning or percentage of work effort involved in scanning. From this group of papers only 2 papers reported on actual time spent scanning by managers or executives – Kefalas & Schoderbek (1973) and Hambrick (1982). The methodological approach in the other papers precluded gathering data on average time spent scanning that could be generalised to the managerial population. For example, in Keegan's (1974) study of critical incident reconstructions, respondents were asked to reflect on a small number of instances and describe 1) source of the information, 2) why they received this information, 3) how they received this information, and 4) to whom they passed this information. The responses were then subject to classification and relative analysis. The study done by Daft, Sormunen, & Parks (1988) measured scanning but only via a frequency of source question i.e. the frequency of referencing different sources (i.e. daily, weekly, monthly, or less frequently) such as written internal, written external, personal external contacts, and personal internal contacts were measured. Other studies were more conceptual in nature exploring the relationship between scanning and interpretation and organisation actions and performance along with some frequency of use of information sources (Thomas, Clark, & Gioia, 1993). Some of these conceptual studies adopted both a conceptual and "sensemaking" or interpretative perspective (Gioia & Chittipeddi, 1991; Daft & Weick, 1984; Isabella, 1990; Scheid-Cook, 1992) and so understandably provided little empirical data on time spent scanning at the individual manager level. While other studies were empirically based, they too adopted

an interpretative perspective focusing on measures such as perceived organisational characteristics, perceived effectiveness, perceived identity, perceived state of uncertainty etc. and provided no complementary data to this study concerning time spent by managers conducting scanning (Milliken, 1990; Meyer, 1982).

Kefalas & Schoderbek's (1973) study presented the results of an empirical investigation of the scanning process. As such, they reported directly on the average amount of time spent for acquisition of external information; the kinds of external information acquired or alternatively, the distribution of time spent in acquiring external information among the five sectors of the external environment; the sources of external information utilised by executives; and the ways of acquiring external information. The average amount of time devoted to scanning was measured in hours per working day. Based on data from 89 respondents, the average time in hours per working day spent scanning was 1.8. On a weekly basis this equates to 9 hours per week; this is broadly in line with this research results concerning average time spent scanning per week of 9.8 mean score.

Hambrick's (1982) study did capture data on time spent scanning. His approach to measuring scanning used three methods – 1) the frequency method which involved asking respondents how frequently they learned of events or trends in twenty subsectors of the environment; 2) the interest method which involved asking executives to rate the extent to which they made a point of staying abreast of various subsectors of the environment; and 3) the hours method which involve asking executives what percent of their scanning time was directed at each of the environmental sectors and, in turn, how many total hours they spent scanning in an average week. It is this last method that provided comparable data of direct interest. The type of industry in which the executives worked and their mean scanning time per week were as follows: College executives – 8.78; Hospital executives – 8.47; and Insurance executives – 10.19. The overall average therefore was 9.15 hours per week; this is broadly in line with this research results concerning average time spent scanning per week of 9.8 mean score.

Hambrick (1982) and Kefalas & Schoderbek (1973) and now this research, identified the average time spent scanning per week to be equal to at least 9 hours on average and less than 10 hours. Although the actual number of studies that capture actual time spent scanning is very few, the results are consistent over a thirty year time span and support the contribution that scanning is a significant activity among managers representing approximately 25% of their weekly work effort

In summary, scanning is a significant managerial activity in at least two senses. First, it is a recognized, well understood, and major function that managers report they regularly engage in. Second, managers spend a significant amount of time scanning their business environment.

Managers scan in different ways

This research provided evidence to suggest that senior managers do scan in predominantly different ways. This evidence emerged firstly from analysing responses to the survey question concerning scanning modes, and secondly from analysing the survey responses to a set of forty four managerial statements concerning scanning behaviour.

In this research, respondents were asked to identify which of four scanning modes reflected their predominant scanning mode. The scanning mode descriptions used were as follows: undirected viewing – general exposure to information where there is no specific purpose in mind with the possible exception of exploration; conditioned viewing – directed exposure, not involving active search, to a more or less clearly identified area or type of information; informal search – relatively limited and unstructured effort to obtain specific information or information for a specific purpose; and formal search – deliberate effort, usually following a pre-established plan, procedure or methodology, to secure specific information or information relating to a specific view (Aguilar, 1967). Responses resulted in a significant representation of managers across all four possible modes: undirected viewing (15.4%), conditioned viewing (31.7%), informal search (24.6%), and formal search (28.3%). These results indicated that senior managers do differ in terms of purposefulness of search and specificity of information sought when scanning. Further, it appears that settling on four gradients of differentiation on these scales (i.e. purposefulness of search and specificity of information) were meaningful and useful to distinguish scanning behaviour among senior managers.

An analysis of the survey responses to a set of forty four statements concerning scanning behaviour was conducted using principal components analysis. The results of this analysis identified four significant underlying components or dimensions of scanning behaviour. This analysis was helpful to provide some additional understanding into the phenomenon of scanning behaviour and to provide a means to differentiate among such behaviour. As per Section 6.2.5, Scanning Behaviour Components, the principal components analysis identified four meaningful scanning behaviour components labelled *formality*, *personal*, *incompleteness*, and *breadth*. Each of these components provides a basis on which to measure how managers differ in their scanning behaviour. For example, with respect to *formality*, some managers adopt a very formal and systematic approach to scanning that involves explicitly stating scanning related purposes, defining the type of information sought, and identifying the means by which the required information will be gathered, analysed, and reported. Other managers are much less formal in their approach, preferring to periodically informally view items of information that they are intuitively interested in using alternating sources and methods. Each of the four scanning components provided some insight into the range of scanning behaviours that essentially define major scanning behavioural traits. The points of differentiation and range of behaviours were elaborated upon in Section 6.2.5.

The contribution of this research with respect to commenting on the differentiability of scanning behaviour among managers is two-fold. First, using the scanning mode typology offered by Aguilar (1967) it was concluded that scanning behaviour is meaningfully distinguishable using the descriptions offered in his research. Aguilar (1967) did not actually report on the frequency of adoption of each of the modes he proposed or even use the mode categories within his analysis. Instead, he restricted himself to a general description of modes and then progressed to the “mode assignment problem” of attempting to develop a concept to couple a mode of scanning with an organisational informational need. This problem arises when attempting to understand the behaviour of organizations as they go about meeting their numerous information needs. However, in this research the concern is not directed toward organisational drivers but predominant individual scanning behaviour. Therefore this research serves in part to validate the scanning modes typology offered up by Aguilar specifically from the individual scanning behavioural perspective and provides data on the predominant adoption rate of these specific scanning modes.

The second part of this contribution regarding differentiability of scanning behaviour was to specifically identify four significant differentiable attributes within scanning behaviour. In identifying the attributes that collectively define scanning behaviour, a review of relevant literature was undertaken. The review extended beyond management literature that directly studied scanning behaviour to include literature on information processing and related concepts of task variety (i.e. the frequency of unexpected and novel events that may occur in the conversion process (Van de Ven & Delbecq, 1974)); task analysability (i.e. how individuals respond to problems that arise (Perrow, 1970)); and information equivocality (i.e. the multiplicity of information conveyed by information (Weick, 1979)). Based on these inputs statements were derived that respondents could rate in terms of degree of agreement (e.g. “I think that scanning for relevant strategic information in the environment will always be an incomplete and imperfect process, for the environment is too extensive and complex to be completely analysable”). This process to identify significant scanning component attributes led to the development of an elaborated model of scanning which is presented and commented on in further detail below as a separate contribution.

In summary, managers’ predominant scanning behaviour was significantly represented by each of Aguilar’s (1967) scanning modes (i.e. four modes differentiated by purposefulness of search and specificity of information) which serves as evidence that scanning behaviour meaningfully differs among managers. Further, this research identified four scanning behaviour components that provided greater insight into significant and differentiable aspects of scanning behaviour.

No strong determinants of scanning behaviour emerged

This research specifically tested for the impact of a set of potential influencing variables upon scanning modes (i.e. the four Aguilar (1967) modes differentiated by purposefulness of search and specificity of information). The potential determinant variables were all identified from relevant prior studies with the exception of post graduation education in business and management. This last variable was included on the basis that a significant educational undertaking may change managers to be more

information orientated and pay greater attention the external business environment, hence influencing their scanning behaviour.

For a review of prior studies and influencing variables grouped into four categories - individual perceptions, objective environmental characteristics, individual job characteristics, and organisational characteristics - refer to Section 2.2.4. As this research represented an in-depth analysis of individual scanning behaviour, many of the influencing variables explicitly analysed were those closely related to individual experiential and job characteristics. The potential influencing variables tested were hierarchy, functional role, age, cross-functional experience, post graduate education in business and management, company size, industry affiliation, and organisational strategy process. These variables incorporated the major influencing variables tested in major prior scanning studies, namely size of company, hierarchy, and functional role. A brief summary of the findings for each of the major influencing variables tested now follows.

Size of company:

Aguilar's (1967) study included an analysis of differences in scanning practices according to size of company. One of the key questions he addressed was "how do managers obtain external information?". Aguilar's (1967) data showed that with respect to information from outside sources, the larger the company, the larger the proportion of information that enters on a solicited basis. While for information from inside sources, the smaller the firm, the more its managers seem to rely on information that is solicited, not by some explicit request, but rather in some quasi-programmed way i.e. organisationally solicited information. Aguilar (1967) concluded that size of company did affect how managers obtained information.

Based on Aguilar's (1967) result that large companies are relatively larger solicitors of information, it was expected that senior managers in large companies would adopt a relatively more formal mode of scanning. This seemed reasonable given that the activity of soliciting information is more aligned with the formal mode of scanning than other modes. Some results in this research supported this expected relationship. For example, the percentage of senior managers within large companies that adopted formal search mode was 33.1%, whereas the percentage of senior managers in medium sized companies that adopted the formal search mode was just 23.1%. However, while there was a trend toward this greater level of formal search mode adoption in large companies, the results of the chi square test, stated in Section 6.2.1 Scanning Mode Adoption, showed no significant effect of size of company on scanning mode adopted ($\chi^2 = 5.854$, $df = 6$, $p = 0.440$).

This lack of significant effect of size of company on scanning mode adopted seemed to contradict Aguilar's conclusion that size of company did affect how managers obtained information. However, upon further analysis of Aguilar's (1967) results, this contradiction is not as obvious as first appeared. Aguilar (1967) does report that the larger the company, the larger the proportion of information that enters on a solicited basis, but also states in a footnote that the chi-square probability of the null hypothesis occurring was 0.12. In short, his results also failed to produce a statistically significant

result between the size of company and how managers obtained information at the 0.05 level.

Hierarchy:

Aguilar (1967) collected data on the ways in which different classes of managers obtained external information from personal sources. This included analysing results by managers' level of responsibility, i.e. first, second, and third level managers. He concluded that "differences that might have been expected simply do not appear, for example ... managers at different hierarchical levels" (Aguilar, 1967: 107) and went on to state that "Neither the survey data nor the interview material sheds much light on the significance of, or the reason for, this unexpected similarity. At this stage of our understanding we can only conclude that most classes of managers are to a similar extent directed and assisted by the scanning process." (Aguilar, 1967: 109).

Another study that examined the moderating influence of hierarchical level was Kefalas & Schoderbek (1973). They developed and tested two *a priori* propositions concerning hierarchical level as follows: 1) executives at lower managerial levels are expected to spend less time in acquiring external information than executives in higher levels; and 2) executives at higher organisational levels are expected to utilise more human sources of external information than executives in lower levels. Hierarchical levels were set as upper level (chairman, president, vice presidents) and lower level (primarily middle managers).

The first proposition was initially judged as "accepted" in the body of the paper. However an examination of the data shows that the difference was not very great; upper level executives spent 2.2 hours scanning per work day on average and lower level executives spent just 1.7 hours. In the footnotes of the study it states: "Chi-square tests were performed on the data presented in all the tables and found not to be significant at the 0.05 level. Levels of significance in this study generally parallel those of Aguilar (1967) and Keegan (1967) in which relationship were reported at levels as 0.32 and 0.30" (Kefalas & Schoderbek, 1973: 69). Hence, at the 0.05 level of statistical significance, the relationship was not actually significant.

The second proposition was "rejected"; differences in source usage, importance, and frequency of utilisation between upper-level and lower-level executives was negligible. Hence, both propositions concerning the influence of hierarchy on key aspects of scanning behaviour did not show any statistically significant relationship.

Similarly, the results of the chi-square test in this research, summarised in Section 6.2.1 Scanning Mode Adoption, showed no significant effect of hierarchy on scanning mode adopted.

Functional roles:

Aguilar (1967) analysed how managers obtained information by different functional speciality and concluded that "Other differences that might have been expected simply do not appear, for example, between members with different functional specialities"

(Aguilar, 1967: 107). He did not report any significant differences among general, marketing, and technical managers concerning the extent to which they used outside sources versus inside sources, or on the level of solicited versus unsolicited information gathering.

Similar in outcome to Aguilar (1967), the results of this study concluded that functional roles had no significant effect on scanning mode adoption ($\chi^2 = 10.459$, $df = 9$, $p = 0.351$). The impact of functional role on other specific aspects of scanning behaviour, such as what managers pay attention to and where managers source information from, is commented on later within this section.

Age:

Aguilar (1967) did not specifically test for the influence of age on scanning practices. In this research a review of the potential impact of age on scanning was done. There were no *a priori* assumptions based on prior research that set an expectation that a significant result would arise. Indeed, the results of the chi-square test showed that age had no significant effect on scanning mode adoption ($\chi^2 = 10.410$, $df = 9$, $p = 0.318$).

Industry affiliation:

One of the acknowledged limitations of Aguilar's (1967) study was the bias in the sample toward companies in the chemical manufacturing industry. Aguilar (1967) made an effort to compensate for this sample bias by including a number of managers from other industries, both manufacturing and service, in the study. Additional managers included in his study were stated as representing the following industries: oil, paper, copper and ore, electronics, stainless steel, industrial refractory materials, heating equipment, publications, and investment banking. However, further detailed information on Aguilar's (1967) study population disclosed that the 41 companies included in the study comprised 25 chemical manufacturing companies, 1 pharmaceutical company, 7 non-chemical manufacturing companies, and 8 services companies dealing with the chemical industry to varying degrees. This confirmed a strong bias toward the chemical manufacturing industry. Another indicator of this bias was the percentage of persons interviewed by industry sector; 79 % were from the chemical manufacturers (85 % when the pharmaceutical company is included); 6 % were from non-chemical manufacturers; and 9% were from the chemical related service companies.

Aguilar does not offer a detailed dissection of his results according to industry category. Instead, he offers the following observation: "As might be expected, obvious differences were noted between the chemical and nonchemical companies in terms of organization, goals, and kinds of information scanned. Yet few differences were noted in terms of the essential workings and problems of the scanning process. Clearly, then, the observations and findings of this study are relevant beyond the confines of the chemical industry." (Aguilar, 1967: viii). An alternative view is that this conclusion is contestable based solely of the evidence gathered in Aguilar's (1967) study in light of the substantial industry bias in the study population.

By contrast, in this study a conscious effort was made to secure significant data across multiple industries. The number of responses secured by four major industry classifications (drawn from the Standard Industrial Classification (SIC) scheme of economic activities 1992 produced by the UK Central Statistical Office) were as follows: 80 responses from Manufacturing; 32 responses from Transport, Storage, and Communication; 85 responses from Financial Intermediation; and 119 responses from Real estate, renting, and business.

Unlike the Aguilar (1967) study, this study did unearth evidence that industry affiliation had a significant effect on scanning practices. A chi-square test showed a significant association between industry affiliation and scanning mode adoption ($\chi^2 = 22.008$, $df = 9$, $p = 0.009$). Of particular significance was the high percentage of conditioned viewing within the manufacturing category (42.5%) and the low adoption of undirected viewing within Real estate, renting, and business activities category (10.9%). Relevant detailed results and analysis are included in Section 6.2.1 and 7.2.1, Scanning Mode Adoption.

Cross functional experience:

Aguilar (1967) did not specifically analyze for the potential impact of cross-functional experience on how managers obtain external information. The closest proxy to this test was his consideration of the experience level of managers i.e. experienced managers versus inexperienced managers. He did note one deviation from the general findings of similarity with respect to the purpose of the directed unsolicited information they received. Almost half the information that inexperienced managers received from outside sources was unsolicited and was communicated primarily for the benefit of the source. This was in sharp contrast to those managers experienced in their jobs. Aguilar (1967) rationalised that this may be due to the experienced manager having developed an effective network of communication in which information designed to benefit the source is more prominent. As Aguilar (1967) did not comment on any other significant association driven by level of managerial experience, it appears that he did not uncover any strong association between level of experience and scanning behaviour.

The lack of strong association between cross-functional experience and scanning modes was confirmed in this research through the results of a chi-squared test ($\chi^2 = 10.882$, $df = 6$, $p = 0.092$).

Strategy:

Hambrick (1982) similarly observed that there appeared to be a distinct lack of clear determinants of scanning behaviour. Hambrick (1982) stated that “yet, no clear determinants of scanning behaviour have been found. Perhaps “strategy” is a concept that will help” (Hambrick, 1982: 160). His study, Environmental Scanning and Organisational Strategy, empirically tested the relationships between the environmental scanning activities of upper-level executives and their organisations’ strategies, on the premise that executives would scan to reinforce their organisations’ particular basis for competing.

However, Hambrick's (1982) hypothesised tie between strategy and scanning was clearly not pervasive; upper-level executives did not indicate a consistent, concentrated tendency to scan according to their organisations' strategies. Hambrick (1982) commented that this may be due to a general tendency among executives to scan according to their own personal or functional interests, lack of awareness of the organisation's strategy, or differences in how the researcher and the executives conceived of strategy. Nonetheless the issue of identifying clear influences on scanning behaviour was left unresolved.

Being mindful of Hambrick's (1982) proposals about the relationship between strategy and scanning, this study also undertook some preliminary analysis on this relationship. Given Hambrick's (1982) inconclusive results, this research adopted a differently orientated strategy typology in an effort to test a different aspect of the relationship between strategy and scanning. Whereas Hambrick (1982) adopted a strategy typology that was essentially a content orientated typology (Miles & Snow, 1978), this research adopted a process orientated strategy typology. The analysis involved categorising managers into "high", "medium", and "low" depending on their organisation's strength of association with three (3) different types of strategy processes: visionary, planning, and emergent. A set of chi-square tests were then performed to test for associations. The results showed a significant interaction effect between strategy process planning and scanning mode ($\chi^2 = 14.102$, $df = 6$, $p = 0.029$); the "high" respondent group engaged in relatively more formal search activity than the "medium" and "low" groups. No other significant associations emerged. Among the detailed discussions in Section 7.2.3, Strategy Process and Scanning Mode, it was hypothesised that strategy process may be a weak or remote influence only on scanning mode adoption. The outcome of this analysis was similar to Hambrick (1982) in that ultimately the results were inconclusive.

Post graduate level education in business and management:

The impact of MBA status on scanning behaviour was directly considered in this study. An initial straightforward analysis of the association between MBA status and scanning mode adoption was done. This showed that MBA status did not have a significant effect on scanning mode adoption ($\chi^2 = 4.890$, $df = 3$, $p = 0.180$) although some trends, such as a higher degree of preference for a formal approach to scanning by MBA qualified respondents were noted. Some significant effects of MBA status on other aspects of scanning behaviour, such as scanning time, did emerge and are commented on below.

Overall, summary comments on determinants of scanning modes are as follows. The determinants of scanning mode remain unclear for the most part. Determinants that failed to meet the strict significance standard set were size of company, hierarchy, functional role, age, cross-functional experience, and MBA status. Some significant associations were uncovered between industry and strategy, although ultimately a comprehensive determination of the relationship was elusive.

Based on a comprehensive review of prior scanning studies and a review of the outcome of this analysis into determinants of scanning mode, there do not emerge any unequivocal empirically validated determinants. It is a contribution of this research to have compared and contrasted the research efforts of multiple studies into scanning which confirm a pattern of inconclusive results; a pattern dating back to the late 60s and early 70s.

The above discussion referenced the results of the chi square tests performed to identify significant associations between scanning modes and various independent variables. A further set of tests were also done to test for significant determinants upon scanning behaviour. In these further tests, the dependent variable of scanning behaviour was operationalised using the four scanning components labelled *formality*, *personal*, *incompleteness*, and *breadth*. The results of a multiple regression analysis on the four scanning components showed that the independent variables explained only a small percentage of the variance. In the case of the scanning behaviour component of *formality*, the R^2 was 0.094, reflecting that knowledge of the independent variables input into the multiple regression computation explain only 9% of the variability of the scanning characteristic of *formality*. The Adjusted R Square, a more conservative estimate of the explanatory power of the independent variable was just 0.058. Similar insignificant R^2 results emerged when multiple regression computations were done for each of the further three scanning characteristic dependent variables – *personal*, *incompleteness*, and *breadth*. For the multiple regression computation of the correlation between the independent variables above and the dependent variable *personal*, the R^2 was just 0.034; for the dependent variable *incompleteness*, the R^2 was 0.031; and for the dependent variable *breadth*, the R^2 was 0.042. These results serve to confirm that among the independent variables reviewed, there did not emerge any clear significant *overall* determinants of scanning behaviour.

The next contribution resulted from an analytical effort to test for influences on two more *specific* and measurable aspects of scanning behaviour. The two specific aspects of scanning behaviour tested for were 1) what managers pay attention to, and 2) where managers source information from. These two aspects of scanning parallel the first two core questions that Aguilar (1967) addressed in his research i.e. “what external information do managers obtain ?” and “where do managers obtain external information ?” The analysis and contribution concerning these two questions are discussed in the two sections immediately below.

Some determinants of scanning attention did emerge

This study captured data on the frequency by which managers pay attention to various environmental information sectors. This data provided a general update on the ranking of environmental sectors in terms of attention paid to each. More significantly, an analysis of this data revealed many statistically significant associations between the level of attention paid to various sectors and influencing variables such as functional role, hierarchy, size of company, scanning mode, industry affiliation, cross-functional experience, and post graduate level education in business and management.

In interpreting the results of the statistically significant outcomes between influencing variables and attention paid to environmental sectors it is useful to appreciate a methodology point particular to this research. In this research the environmental sector categorisation used was more granular than in prior studies. In prior studies, the environmental categorisation scheme used typically incorporated no more than five (5) sectors. For example, in the Kefalas & Schoderbek (1973) study the external environment was divided into five sectors being market sector, technology sector, external growth sector, government sector, and other sectors. Similarly, in the Aguilar (1967) study the environmental categorisation scheme comprised five sectors; these were marketing tidings, technical tidings, broad issues, acquisition leads, and other tidings. This research differed through using an environmental sector categorisation comprising fifteen sectors. The fifteen environmental sectors were macro level economic information; trends within your company's industry; functional specialist information; major business leader commentaries; emerging technologies with potential to impact business; management techniques; innovation in a competing product or service; customer companies; supplier companies; joint venture or alliance partners; information about your current company; information about your prior employer company(ies); spending priorities of other companies; regulatory, governmental, and legislative information; and competitor companies. The basis for this elaborated environmental sector categorisation was discussed in the prior Section 6.2.4, Scanning Attention and Influences and is a contribution of this research. As discussed in Section 6.2.4 the typology was developed based on a review of prior literature and also the results of the pilot studies on scanning behaviour. As the environmental sector categorisation scheme used was an elaborated scheme this research was able to identify very specific relationships between influencing variables and attention paid to various environmental sectors.

General finding:

A finding of the research was simply to uncover the weighting of attention paid by managers to each of the fifteen environmental information sectors. For example, the top five sectors monitored were information about your current company, trends within your company's industry, functional specialist information, competitor companies, and customer companies.

Analysis of influencing variables:

Prior studies on scanning tended to focus on three types of influencing variables in particular – functional role, hierarchy, and size of company. Following is a brief summary of the key findings relevant to these influencing variables contrasted with findings from this research. At the end of this section comments on other influencing variables tested in this study – i.e. scanning mode, age, industry, cross-functional experience, and post graduate education in business and management - and a summary of the contribution in this area is made.

Functional roles:

Aguilar (1967) initially reports that managers differed in many ways, as did the information they obtained. He reports that when classified with respect to the functional speciality of respondent managers, the survey data in general reflects a connection between the manager's area of speciality and the subject matter of the external data that the manager collected and regarded as important. Aguilar's (1967) main support for this conclusion is that marketing executives were very much concerned with market tidings information (81 per cent (%) of all responses by marketing executives) and technical managers were much concerned with technical tidings information (40 per cent (%) of all responses by technical managers).

However, Aguilar (1967) also points to a phenomenon of "shared concern" whereby all the functional groups indicated considerable attention to market tidings. As above, this result may also have been exaggerated due to the very broad definition of market tidings. Interestingly Aguilar does not report on the statistical significance of the findings regarding what functional managers pay attention to. This is explained in a note to his findings which reads "Since our purpose is to search for possible relationships rather than to establish such relationships with assurance, limiting observations to relationships with a chi-square test better 0.05, as is often done, would be excessively restrictive. Rather than setting any arbitrary cut-off level, we shall comment on interesting relationships and then indicate an approximate chi-square level. The reader can judge for himself how much confidence he wishes to place on the conclusions." (Aguilar, 1967: 52). As Aguilar (1967) does not report a statistical significance figure in this area of analysis, and in light of the criticisms of the environmental categorisation scheme used, it seems reasonable to conclude that relationship proposed between functional speciality and subject matter is not "stated with assurance" but is indicative only.

Kefalas & Schoderbek (1973) developed and tested a specific proposition concerning functional area and scanning style as follows: "It is expected that there will be a relationship between the manager's functional area or speciality and his scanning style, i.e. executives will acquire more information relevant to their functional area (jobs). A possible exception to this rule is the market sector of marketing information. This information sector is expected to dominate all executive scanning styles regardless of functional area." (Kefalas & Schoderbek, 1973: 68). Kefalas & Schoderbek (1973) used a categorisation scheme of the environment comprising five (5) sectors: market sector, technology sector, external growth sector, government sector, and other sectors. As in the case with Aguilar's (1967) environmental categorisation scheme, this scheme is less granular than desirable in order for significant and distinct relationships between scanning and focus on environmental sector to be identified. The functional speciality areas they used to categorise managers were marketing; production; research and development; finance, accounting, and corporate planning; and other (EDP, IR, PR etc.)

Kefalas & Schoderbek (1973) concluded that their Proposition 5, a positive relationship between the executives functional speciality and the kinds of information acquired, was borne out. The core evidence they site is that marketing and research and

development executives acquired over 50 percent (50%) of their external information from their own sectors, i.e. market and technology sectors respectively, and that other executives spent nearly one-third of their time monitoring their own sectors (although this latter relationship is not exactly borne out in the data as there is not a direct parallel between the functional roles listed and the environmental sector types listed). These results were subject to percentage share analytical comments only and so the statistical significance of the relationships could not be ascertained. Kefalas & Schoderbek (1973) also pointed out that although the market sector of the external business environment seems to occupy a great deal of the executive's time, its predominance is not as great as suggested by other researchers (citing Aguilar, 1967).

As discussed in Section 6.2.4, Scanning Attention and Influences, this research utilised a more extensive environmental sector categorisation scheme than used in prior scanning research efforts. Rather than using five environmental sectors as was done in Aguilar (1967) and Kefalas & Schoderbek (1973), fifteen environmental sectors were used in the analysis. In terms of functional role categories, four functional roles or groupings were used in this analysis being: general management, business development, operations, and support; this categorisation scheme was consistent with other strategic management studies concerning functional experience (Bowman & Daniels, 1995). Again, this categorisation scheme was more granular than that used by Aguilar (1967) or Kefalas & Schoderbek (1973) and represents a contribution in terms of the specificity of relationships between functional area and attention paid to environmental sectors that were empirically tested.

The results of this research supported the finding that functional roles have a significant effect on the attention paid to environmental information. Further, because of the nature of the tests conducted, i.e. a one-way ANOVA for the four functional roles applied over all fifteen different types of environmental information, it was possible to specifically identify which relationships were statistically significant. This represents a contribution beyond the more general and inconclusive descriptive form of analytical comments offered in prior research. The results showed that there was a significant effect of functional role on two types of information: functional specialist information and customer companies. Operations managers paid significant attention to functional specialist information; much more so than general managers or business development managers. Also, the results showed that business development managers paid significantly more attention to customer information than support managers. Full details of the tests performed and analytical comments were made in Section 6.2.4 and Section 7.2.4.

Common to all the studies reviewed above is the link between market orientated managers seeking out market orientated information, and technically orientated managers seeking out their own specialist types of information. This collective evidence, some qualitatively based and now some further quantitative results, generally points to a valid relationship between functional roles and what managers pay attention to.

The functional bias phenomenon has been the subject of much research dating back to Dearborn & Simon (1958) who continue to be cited as evidence that managers are functionally biased with respect to their information processing. The core of their argument is that exposure to the goals and a reinforcement of a particular department promotes a viewpoint that inclines a manager to attend only to certain information in a situation that relates specifically to the activities of that department.

However, a study by Walsh (1988) which was in part a conceptual replication and extension of Dearborn & Simon's (1958) study, concluded that "contrary to what might be expected from Dearborn & Simon's (1958) results, no simple link emerged between work experience and the content of belief structures". Walsh (1988) reported that few managers viewed their organisational worlds along narrow functional criteria and that three quarters of participants had either strong conceptions of success that crossed functional lines or had no firmly held dominant conception of success. Walsh's point was that the selection of manager's perceptions may not be as constrained as Dearborn & Simon (1958) thought. This is also broadly consistent with the results of this study and the prior studies reviewed. There were instances of strong relationships between function and environmental sectors information (e.g. marketing personnel seeking market related data), but there were also many instances of functional managers seeking broader environmental information outside of their specific functional area. It is the few strong relationships that led to an overall statistically significant result between function and information paid attention to, but it is also important that the broad weaker relationships not be overlooked as they are important to informing us about current scanning behaviour. Bowman & Daniels (1995) informatively sum up Walsh's results to suggest that "managers are capable of attending to diverse information, but may be more likely to attend to and interpret information that previous experience has suggested may be important to them (as suggested by functional background)." (Bowman & Daniels, 1995: 160).

Hierarchy:

Aguilar's (1967) examination of scanning by different hierarchical levels reveals "surprisingly" few differences in regard to subject matter scanned. He notes that market tidings accounted for close to 60 per cent (60%) at first, second, and third levels and that there were very few differences even for subject-matter categories where one might expect significant differentiation among levels – e.g. in the case of Broad Issues.

Kefalas & Schoderbek (1973) did not develop and test a specific proposition concerning managerial hierarchical level and scanning. However, upon an analysis of their Table 3, Percentage Scanning Time devoted to each of the sectors of the External Environment, it was clear that there were no significant differences between scanning attention paid to the five sectors (market, technology, external growth, government, and other) between upper and lower level managers.

In this research there was a significant effect of hierarchical level on attention paid to 3 types of information: business leader commentaries, management techniques, and information about your prior employer company (ies). Top tier managers paid significantly more attention to major business leader commentaries and management

techniques than lower level managers. Top tier managers paid significantly more attention to information about prior employer company (ies) than medium tier managers. These relationships were identified in part as a result of the detailed environmental information category scheme used (i.e. incorporating fifteen (15) environmental information categories) and the nature of the test used, i.e. a one-way ANOVA.

A contribution of this research in this area is the identification of a very specific set of relationships between hierarchy and information that managers pay attention to.

Size of company:

Aguilar (1967) caveats his analysis of the relationship between scanning and company size by acknowledging upfront a difficulty with the representativeness of his survey population which precludes any broad analysis and generalisable findings. The specific problem was that the number of technical managers interviewed was poorly balanced among the different-sized companies, seriously distorting the distribution for technical tidings as a function of company size.

Despite these problems with representativeness, Aguilar (1967) argues that based on the few comparisons that could be made, specialisation in securing information is affected by the size of the company in which a manager works. The comparisons offered are that managers in large companies are less concerned with market and technical tidings and more concerned with broad issues, acquisition leads, and other tidings than high level management in medium-sized companies. The fact that this analysis offered was particular to high level managers only and only compared large companies with medium sized companies suggests that these results are the more dramatic among the entire set of results. Aguilar (1967) also seeks out and reports another “striking” difference being the relative concern with Broad Issues for managers in small and large companies. In this case, the larger the company the more its managers secure information about broad issues.

Kefalas & Schoderbek (1973) did not test for relationships between size of company and attention paid to different sectors of the external environment.

This research uncovered a significant effect of size of company on many types of information. Six environmental information types were impacted on: management techniques; customer companies; supplier companies; information about your current company; regulatory, governmental, and legislative information; and competitor companies. The underlying differences, i.e. which size companies pay relatively significantly more or less attention than expected, is presented in detail in Section 6.2.4 and further discussed and analysed in Section 7.2.4. The results of the detailed post-hoc tests essentially revealed that small companies pay a relatively higher degree of attention to management techniques and customers, mid-size firms focus on supplier information more so, and large companies invest more time and attention attuned to competitor information. These results are difficult to reconcile with Aguilar’s (1967) results in the same area. Aguilar (1967) reports that large companies are less concerned with market tidings compared to other information areas, yet competitor information

was incorporated into Aguilar's (1967) category market tidings. His result is contrary to what was found in this research i.e. large companies pay more attention to competitor information than medium sized companies. Aguilar (1967) also found that large companies pay relatively more attention to broad issues. In this research, it might therefore be expected that large companies would pay relatively more attention to macro-level economic information, trends with your company's industry, or major business leader commentaries; however these results did not emerge.

Unlike the analysis applied to prior studies and this study concerning functional roles and scanning, the results concerning size of company and scanning do not appear to be complementary. Instead, the conclusions of Aguilar (1967) are subject to challenge and further interpretation due to the environmental sector classification scheme used and the results of this study are so particular to specific environmental information sectors that they resist direct comparison with other studies. Nonetheless, both the Aguilar (1967) study and this study do suggest some impact of size of company on scanning practices. The exact nature cannot be stated with great assurance (as the two studies are not complementary) and the specific conclusions from this study, while statistically valid and based on a large sample size of 394 respondents, should sensibly be subject to further empirical evaluation to ascertain the true strength of the relationship and reliability of the findings.

Other determinants tested i.e. scanning mode, age, industry, cross-functional experience, and MBA status:

As discussed above, prior empirical tests have focused on the influencing variables of functional role, hierarchy, and size of company. In this research, further tests of potential determinants were extended to include a further five potential determinants being scanning mode, age, industry, cross-functional experience, and post graduate education in business and management.

Scanning mode was shown to significantly affect the level of attention paid to competitor information and spending priorities of other companies. In both cases adoption of a formal scanning mode was associated with a greater level of attention.

Although Age as a determinant did produce a statistically significant result with respect to two types of information – functional specialist information and customer companies – there were no *a priori* assumptions that explained these results nor any sufficient systematic biases to draw any generalisable conclusions. Hence, no further analysis was pursued.

The results of a conservative post-hoc test showed that Industry did significantly impact on attention paid to two environmental information areas – macro level economic information; and regulatory, governmental, and legislative information. Broadly, in both cases, managers in financial intermediation paid significantly more attention to this type of information than did managers in Real estate, renting, and business activities.

Cross-functional experience did significantly impact on attention paid to emerging technologies with potential to impact business; information about your prior employer company (ies); and spending priorities of other companies. The most significant business insight was that managers with no cross-functional experience paid relatively significant amounts of attention to new and emerging technologies information.

Post graduate education in business and management was shown to significantly affect the level of attention paid to two areas: management techniques information and information about your current company. It emerged that Non-MBAs paid significantly more attention to both these areas compared to MBAs. This was possibly due to Non-MBAs seeking management technique information to fill a perceived skill gap and also them being slightly more internally orientated.

In addition to the above tests to identify significant influences on scanning attention, some further alternative tests were conducted. These alternative tests operationalised scanning attention into three major components – i.e. *market*, *chain*, and *specialist* – and tested for the impact of various independent variables using multiple regression. For details concerning how principal components analysis was used to derive the three major scanning attention components, refer to Section 6.2.7. The results of the multiple regression computations produced low R^2 results: for the dependent variable *market*, R^2 equalled just 0.070; for the dependent variable *chain*, R^2 was 0.029; and for the dependent variable *specialist*, R^2 was 0.055. These results suggested that the independent variables tested accounted for only a negligible amount of variability in the dependent variables concerned. Hence, no useful relationships or predictors were identified.

At first glance, the results of the multiple regression computation appear to be at odds with the earlier tests. This may be due, in part, to the methodology adopted in the earlier tests. As previously discussed, the methodology used in the earlier tests used a very granular environmental categorisation scheme comprising fifteen environmental sectors. This increased the chances of identifying very specific relationships between influencing variables and attention paid to various environmental sectors. In contrast, the multiple regression computation used just three environmental constructs labelled *market*, *chain*, and *specialist*. When using just three environmental constructs the strength of identifiable relationships between independent and dependent variables diminished. This is consistent, in principle, with the studies by Aguilar (1967) and Kefalas and Schoderbek (1973) that also used just a few environmental sectors.

In summary, many significant associations between influencing variables and level of attention paid to various environmental sectors emerged in the earlier tests using an elaborated environmental sector typology. Determinants of attention identified in this research and generally supported in other studies included functional role, hierarchy, and size of company. Further influencing variables tested through this research included scanning mode, industry, cross-functional experience, and MBA status. These associations were informative to developing an understanding of biases or tendencies in terms of attention afforded to various sectors. This understanding was incorporated into the theoretical contribution concerning effective scanning behaviour discussed below.

Managers use similar sources of information

This research captured data on the frequency that managers source information across four sources being: 1) personal networks of individuals outside your company, 2) internet sources including search engines, company websites, email information subscription services, 3) traditional mediums such as television, radio, newspaper, business magazines, etc. and 4) company personnel such as superiors, peers, and subordinates. Among the analytical findings, the relative significance of the internet related sources was apparent. An analysis of the influence on where information was sourced from was also conducted. The influencing variables tested for were size of company, hierarchical level, scanning mode, functional roles, age, industry, cross-functional experience, and post graduate education in business and management. Finally, an analysis was performed on information received but not actively solicited i.e. passive receipt of information both formally and informally.

The significance of the internet related sources emerged as it was rated the most frequently referenced source of information for managers, followed by company personnel, traditional mediums, and finally personal network of individuals outside the company.

Analysis of influencing variables:

Following is a brief summary of key findings concerning the influencing variables tested along with selected evidence from other comparable studies.

Size of company:

Size of company was significantly associated with frequency of use across the four sources. The significant result for this research was that senior managers in small companies utilised the source of company personnel much less frequently than did senior managers in medium or larger sized companies. Aguilar (1967) also analysed sources used in relation to the size of the managers company. He classified sources into the following four major types at a high level: outside personal sources, outside impersonal sources, inside personal sources, and inside impersonal sources. While Aguilar's (1967) categories of sources were not directly comparable with the categorisation scheme used in this research, some of his overall findings were nonetheless informative. Aguilar (1967) concluded that different sized companies tended to differ in their use of sources in two principal ways: 1) the extent of their overall reliance on inside sources, and 2) in their selection of outside sources. His data showed a distinct tendency for managers in large companies to rely much more heavily on inside sources than do managers of small companies. His data on outside sources showed that managers in small companies rely more on customers and suppliers as sources of external information. Hence, Aguilar's (1967) study and this research were confirmatory of the significantly increased use of company personnel as a source of external business environment information in large companies. This result is not unexpected as smaller companies employ less people and therefore are not as prominent a source of information as in larger companies. The more interesting positive implication is that large companies have a greater resource on which to draw

that may contribute to a dynamic capability to more effectively scan the environment. While a potential negative implication is that information on the external business environment that is communicated through personnel in large companies may be biased as it is substantially interpreted through a lens conditioned by company experience.

Interestingly, all other significant relationships identified were associated with one source in particular, the internet source. The significant relationships emerged between hierarchy and internet source usage, and post graduate education in business and management and internet source usage. The particularly significant differences to emerge were: top tier managers used the internet and internet related sources much less frequently than lower tier managers and MBA graduates used the internet significantly more than Non-MBA graduates. All other associations – i.e. industry, scanning mode, functional role, age, and cross-functional experience – were not significant according to the post-hoc test results.

Hierarchy:

With respect to sources used in relation to managers' level of responsibility, Aguilar (1967) initially reports that data on outside sources employed showed a slight specialization by the different levels of management. However, Aguilar (1967) offered the following caveat - "this specialization, however, partly stems from a factor other than level; namely, the unequal distribution of different kinds of functional specialists in the study population. For example, when second-level managers are found to show a strong reliance on customers, this is so at least in part because the study population comprised a high proportion of second-level managers connected with the marketing function" (Aguilar, 1967: 76). Without knowing the exact number of functional managers included at the first, second, and third levels it is not possible to make the sorts of interpretations and analytical adjustments necessary to determine the underlying reason for the apparent specialised results by level of management.

Kefalas & Schoderbek (1973) also tested a proposition connecting hierarchical level and sources used to obtain external information. In their study, Proposition 4 stated that "Executives at higher organizational levels are expected to utilize more human sources of external information than executives in lower levels. This relationship is expected to be true for both industries". Kefalas & Schoderbek (1973) divided sources into three categories: 1) documentary, 2) human, and 3) combination. A total of 32 sources of external information were considered, 14 of them being human sources (superiors, subordinates, etc.), thirteen of a documentary nature (professional journals, trade magazines, etc.), and five combinations (formal or informal meetings inside or outside the firm). The results showed that the overall degree of usage of documentary sources was 59 %, for human sources it was 55%, and for combination sources it was 68.3%. The results are somewhat difficult to interpret as they are based on whether executives reported that they had used one or more of sub-category sources listed under documentary, human, or combination. Hence, it could be argued that the more extensive the list of sub-categories the higher the probability that an executive would have used at least one of these sources resulting in a higher overall reported usage figure at the category level. In any case, based on their methodology and results,

Proposition 4 was rejected; executives at higher levels utilised approximately the same level of human sources as lower level executives.

As above, the results of this research showed a distinction regarding sources used based on hierarchy with respect to one source only – the internet. There was very little difference in the pattern of usage of the other three sources – personal networks, traditional media, and company personnel – when analysed by hierarchical level. Based on these results, and the inconclusive results of the other studies, an obvious set of associations between hierarchical level and where managers source information from did not emerge.

Functional roles:

With respect to functional specialisation, Aguilar (1967) reported that the data tended to show a degree of specialisation by managers with respect to outside sources. For example, marketing managers secure much of their information from customers; suppliers were a relatively important source for production managers; bankers and brokers were a relatively important source for financial managers etc. However it should be kept in mind that these results were indicative only and in the data table itself there were multiple instances where insufficient data was available.

In this research, no significant associations were identified between functional roles and frequency of use across the four sources. All told, there was little consistent evidence to suggest that managers in different functions substantially use different sources to obtain external information. Generally comments on the overall relative use of sources are made below.

Other determinants tested i.e. scanning mode, age, industry, cross-functional experience, and post graduate education in business and management.

The determinants of scanning mode, age, industry, cross-functional experience were not significantly associated with significant differences in use of sources according to the post-hoc test results. The only statistically significant result to emerge was with respect to post graduate education in business and management. MBAs used the internet and internet related sources significantly more than non-post graduates in business and management.

General comments:

A significant finding was that there was very little difference in the pattern of usage of the other three sources – personal networks, traditional media, and company personnel – when analysed by hierarchical level, scanning mode, functional role, age, industry membership, cross-functional experience, and post graduate education in business and management. As commented on above, the only statistically significant associations that emerged, with the exception of size of company, were particular to the internet and internet related sources.

As above, a general finding of this research was the significance of the internet related sources relative to other sources of company personnel, traditional mediums, and personal networks of individuals outside the company. Other past studies have contributed to an understanding of the mix of use between personal sources versus documentary sources in general. For example, Keegan's (1974) study, *Multinational Scanning: A study of the information sources utilised by headquarter executives in multinational companies*, analysed where managers source information from using a categorisation scheme comprising three basic types: human, documentary, and physical phenomena. His findings were that human sources were clearly more important than documentary and physical phenomena sources combined, accounting for 67 percent of all important external information reported by respondents. Keegan (1974) found that although for the organisation as whole, external information comes originally from outside the company, for the individual executive, much of his external information comes from sources inside his organisation. In interpreting these results it should be kept in mind that Keegan's (1974) sample comprised multi-national companies only.

These results were consistent with Aguilar's (1967) findings that "personal sources greatly exceeded impersonal sources in important (71 percent versus 29 percent), and thus indicated the relatively heavy reliance that managers place on their personal networks of communication (both private and organisation)" (Aguilar, 1967: 94). The greater preference for personal sources in states of high uncertainty was also observed by Daft, Sormunen, & Parks (1988). Their findings were consistent with the literature on organizational information processing that states that non-routine, uncertain tasks require greater information processing (Culnan, 1983; Daft & Macintosh, 1981; Tushman & Nadler, 1978; Galbraith, 1973).

The importance of the role of personal sources in providing external information was reinforced in this research when examining the passive receipt of information, i.e. information that is brought to the attention of a manager through either formal or informal means. The analysis accounted for receipt of information from three internal sources (superiors, peers, and subordinates) and three external sources (consultants, market research professionals, and industry commentators). For internal sources, all informal passive receipt of information was significantly higher than formal passive receipt. In terms of frequency, the most regular source of information comes from peers, followed by superiors and subordinates. In contrast, the opposite was true for external sources. For external sources, all formal passive receipt of information was significantly higher than informal passive receipt of information. In terms of frequency, the most regular receipt of information comes from industry experts, followed by market researchers and then consultants.

A relevant finding from Kefalas & Schoderbek (1973) found that of the combination sources, informal-meetings-inside were cited as the highest degree of usage followed by formal meetings-inside. This preference of inside meetings indicates the heavy reliance executives place on their personal communication networks within their own environments. This reliance is understandable as personal informal communication with company personnel can be a very efficient way to communicate, receive, and/or dialogue on business environmental matters of interest. Close proximity to company personnel increases the opportunities for interaction with these sources and there often

develops a credibility and trust among personnel that facilitates the exchange of information. Company personnel sourced information is also valuable as the information has been partially processed or assessed as to its relevance and value. As information received from certain sources proves itself to be salient and significant, the credibility and trust assigned to the source increases. This in turn may contribute to the further facilitation of information exchange and the increasing frequency of use of company personnel as a source of external business information.

An analysis that appreciated the complementary nature of using both written and personal sources was offered by Daft, Sormunen, & Parks (1988). They comment that personal sources are important because their richness enables subtle signals to be detected (Daft & Lengel, 1984), whereas written media are important because tangible data can be gathered and communicated about discrete events. A weak signal from one source may trigger the use of a complementary medium. Further comments on the complementary use of alternative sources of external information are offered below in the Section 8.3, Managerial Implications.

Due to the recency of the internet phenomenon, prior studies have not incorporated analysis on the impact of this new technology on scanning practices. For example, Keegan's (1974) observation that systematic methods of information scanning were virtually non-existent as were computer based systems of information retrieval requires updating in light of the emergence of the internet and prevalence of the use of internet based email. A minor contribution of this research was to gather data on the use of the internet by senior managers and to analyse it in the context of other information sources.

Finally, an additional analysis was undertaken as a check on the above results. This involved a multiple regression computation including the independent variables of hierarchy, functional roles, age, cross-functional experience, post graduate education in management, company size, and industry categorisation. The R^2 results were as follows. For the dependent variable *network*, $R^2 = 0.045$; for the dependent variable *internet*, $R^2 = 0.068$; for the dependent variable *media*, $R^2 = 0.031$; and for the dependent variable *personnel*, $R^2 = 0.052$. These results suggested that the independent variables tested, accounted for only a negligible amount of variability in the dependent variables concerned. Hence, these additional tests confirmed the lack of identifiable significant influencing variables on use of scanning sources.

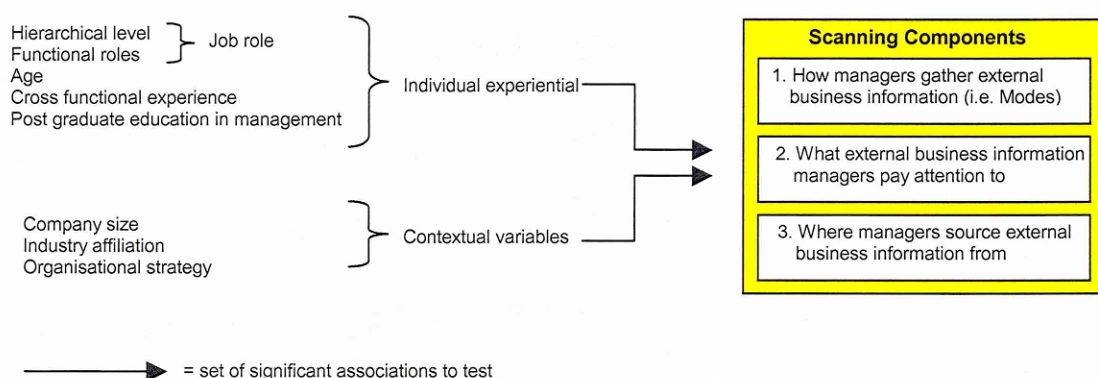
In summary, a body of evidence confirms that larger sized companies do source significantly more information via internal company personnel than do smaller sized companies; there is insufficient evidence to indicate any significant associations between hierarchy, functional role, scanning mode, age, industry, cross-functional experience, and post graduate education in business and management and differences in usage across four information sources of personal networks, internet, traditional mediums, and company personnel (except for internet source usage by MBA status and hierarchy); the importance of personal sources versus documentary sources was reinforced; and the significant role of the internet as the most frequently utilised source by senior managers was established.

An elaborated model of scanning emerged

As a result of conducting the prior tests into how managers gather external business information, what external business information managers pay attention to, and where managers source external business information from, an elaborated model of scanning emerged.

This initial model which guided this research was presented in Figure 11, in Section 3, Theoretical Framework. For ease of reference, this model is recreated in the below Figure 46.

Figure 46: Theoretical framework: Influences on scanning behaviour.



On the right hand side of the above figure is a basic model of scanning comprising three components. These components cover a wide range of scanning behaviour of interest to this research and were derived from a review of major prior scanning studies. As this research progressed, an improved understanding of scanning practices enabled each of the above components to be elaborated upon.

Scanning component 1 concerned how managers gather external business information. This first component was labelled as scanning behaviour. In this research, this concept was operationalised in two ways. First, Aguilar's (1967) four scanning modes – undirected viewing, conditioned viewing, informal search, and formal search – were used as a proxy for scanning behaviour. However, it was a somewhat crude measure as only one scanning mode could be associated with an individual manager. This measure required that an individual manager select which mode best reflected his or her predominant mode. The measure was also crude in the sense that it relied on a single question response in order to categorise managers' behaviour.

The second form of operationalisation of scanning behaviour was to identify some significant underlying components or dimensions of scanning behaviour. This was achieved through undertaking a principal components analysis on many statements concerning scanning behaviour. The components of scanning behaviour were identified based on respondents ratings on forty four statements concerning aspects of scanning behaviour. Using principal components analysis, a set of four meaningfully differentiable components or aspects of scanning behaviour were identified. This

research attempted to develop further insights into scanning behaviour by highlighting some new dimensions of scanning that more broadly reflect the wide range of scanning behaviour adopted by managers in practice. Hence, a wide range of statements concerning various aspects of scanning behaviour were included in the survey and formed the basis for the principal components analysis. These statements were developed based on aspects of scanning behaviour identified in prior papers and on insights gleaned in the pilot study. The statements underlying the principal components analysis reflected multiple dimensions including: deliberateness of search; specificity of information sought; structured approach or method of gathering information; the capacity to absorb information; interpretative ability; comfort with large volumes of information; number and variety of information sources referenced; congruence with work role; available time for scanning; and limiting flow of information in instances of information overload. The statements underlying the principal components analysis also included the dimensions of purposefulness of search and specificity of information. This was significant as it was these two dimensions upon which the Aguilar's (1967) scanning typology was developed i.e. undirected viewing, conditioned viewing, informal search, and formal search. As the new scanning behaviour components are based on statements that include those relevant to Aguilar's (1967) modes, it was expected that the new components would be a more adequate description of the important dimensions of an individual's scanning behaviour. Also, the scanning behaviour components identified in this research resulted from applying the analytical technique of principal components analysis and in doing so removed a degree of subjectivity associated with prior scanning behaviour studies. For a detailed description of the principal components analysis undertaken and the identification of four significant scanning behaviour components, refer to Section 6.2.5. The four scanning behaviour components identified were labelled *formality*, *personal*, *incompleteness*, and *breadth*. It is these components that were included in the elaborated model of scanning as presented in Figure 46 below.

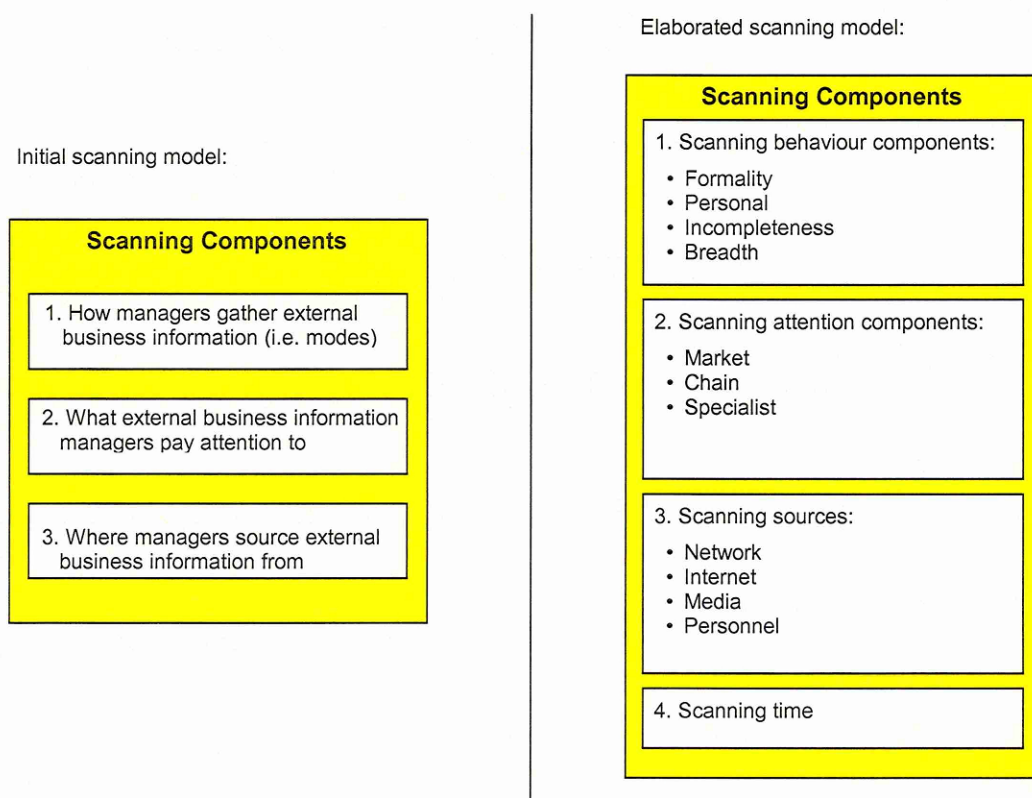
Scanning component 2 concerned what external business information managers pay attention to (i.e. scanning attention). In this research, an extensive typology of environmental information sectors was used in the tests as to what managers paid attention to. The environmental typology used comprised 15 different types of business environment information. This was helpful to identify some specific relationships between various independent variables and the degree of attention paid to each sector. However, the operationalisation of the environmental information sectors did not readily allow itself to be compared with other typologies used in prior studies. Other environment sector typologies typically comprised just a few major areas. Hence, an alternative way to operationalise what external business information managers pay attention to was undertaken. This involved performing a principal components analysis on the fifteen business environment information types in an effort to identify whether some of these were closely related to one another, and whether a smaller set of environmental sectors could be used to summarise the major types of business environment information that managers pay attention to. For a detailed description of the principal components analysis undertaken and the identification of three significant scanning attention components, refer to Section 6.2.7. The three scanning attention component identified were labelled *market*, *chain*, and *specialist*. These components were intuitively meaningful as they referred to broad external market information,

industry level information concerning customers and suppliers, and internal operational specialist information. Therefore, these three components were incorporated into the elaborated scanning model under the heading scanning attention, as presented in Figure 46 below.

Scanning component 3 in the initial model concerned where managers source external business information from. In Section 6.2.6 is further detail of the tests conducted regarding sources of information. In these tests, four main sources of information were considered: personal networks of individuals outside the company; internet sources including search engines, company websites, and email information subscription services; traditional mediums such as television, radio, newspaper, business magazines etc.; and company personnel such as superiors, peers, and subordinates. These were labelled *network*, *internet*, *media*, and *personnel* respectively, and incorporated in to the elaborated scanning model, as presented in Figure 46 below.

One aspect of scanning that was considered in this research, but not included in the initial scanning model, was time spent scanning. This was an important aspect to research as it confirmed that scanning remains a significant managerial activity and consumes a significant amount of time. The research confirm that the role of manager as monitor (i.e. scanning activity) remains among the top 10 managerial roles currently fulfilled by practising managers. Scanning time was also incorporated into the elaborated scanning model, as presented in Figure 47 below.

Figure 47: Elaborated model of scanning.



Scanning is an embedded managerial routine

The elaborated scanning model was tested throughout this research. Specifically, tests were conducted to test the strength of relationship between certain job role, individual experiential, and contextual independent variables upon each of the scanning components (i.e. scanning behaviour components, scanning attention components, scanning sources, and scanning time).

The results of the tests on scanning behaviour components indicated only weak associations with job, individual, and contextual variables. The multiple regression computations revealed only one significant effect, albeit a weak effect, on the *formality* dimension ($R^2 = 0.094$; $F_{(13,331)} = 2.629$, $p < 0.05$). For details of the multiple regression computation and analysis refer to Section 7.2.5, Scanning Behaviour Components.

Similar results were uncovered when examining Scanning Attention Components. Again, only weak associations were identified with job, individual, and contextual variables. The multiple regression computations revealed only one significant effect, albeit a weak effect, on the *market* sector of attention ($R^2 = 0.070$; $F_{(13,334)} = 1.922$, $p < 0.05$). For details of the multiple regression computation and analysis refer to Section 7.2.7, Scanning Attention Components. In an earlier set of tests some significant associations were identified between scanning attention and various independent variables. However, these results were from tests in which scanning attention was operationalised into 15 environmental information sectors. In other words, the results were particular to the initial scanning model and not the elaborated scanning model. In the elaborate scanning model, scanning attention was operationalised into three components of *market*, *chain*, and *specialist*. These results and analysis are provided in Section 7.2.4, Scanning Attention and Influences.

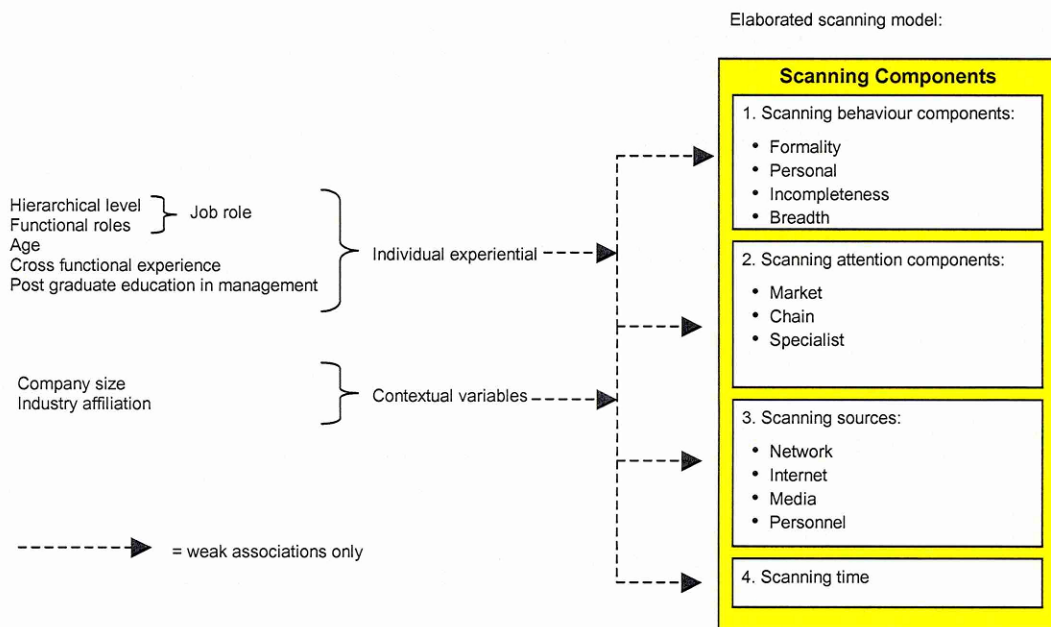
In the case of scanning sources, some specific significant relationships between certain independent variables and sources did emerge from the ANOVA tests. However, these were mostly particular to the internet source and are commented on separately in the analysis section. The multiple regression computations revealed only one significant effect, albeit a weak effect, on internet source ($R^2 = 0.068$; $F_{(13, 332)} = 1.877$, $p < 0.05$). The combination of these tests and analyses suggest that substantially managers reference similar sources. For details of the tests done and analytical comments, refer to Section 7.2.6, Technology Influence.

The results of the ANOVA tests concerning scanning time identified three variables that were significantly associated with time. These variables were functional roles, post graduate education in management, and company. However, the majority of independent variables tested were not significantly associated with scanning time. Further, the results of an analysis of the effect of the key independent variables on scanning time using multiple regression produced a low, albeit significant, R^2 of 0.074; $F_{(13,314)} = 1.937$, $p < 0.05$. This result meant that only a very small percentage of the variability in the dependent variable *time* was accounted for by the independent variables tested. On balance, the results of the ANOVA test and the multiple regression suggest an overall weak relationship between independent variables and scanning time.

In practice, scanning time assumes a significant portion of managerial time per week at 9.87 hours mean, 8 hours median, and 10 hours for the mode.

Based on the above results, it is possible to represent the overall strength of relationship between the key independent variables and scanning. This is done in Figure 48 below. In Figure 48, the strength of relationships is presented as weak only. This is the case on average, as discussed above. There are exceptions to this whereby certain specific significant relationships did emerge through the analysis (e.g. associations with scanning attention). However, with particular regard to the multiple regression analyses that were performed on each element in the new elaborated scanning model, the presentation of an overall set of weak associations is supportable.

Figure 48: Summary of associations with the new elaborated scanning model.



Given the above representation of an overall set of weak relationship between the key independent variables and scanning practice, consideration was given as to why. It was hypothesised that this may be due to flaws in research methodology or a flaw in the underlying conceptual model being tested that assumes there is a relationship between the contextual and experiential variables in question and scanning behaviour. A methodological flaw would result from a failure to effectively operationalise the relevant variables i.e. the influencing variables and the concept of scanning itself. As the influencing variables are reasonably well identified (e.g. size of company, functional role, etc.) and validated through use in many prior research studies, it seemed reasonable to assume that methodological challenges are more likely to concern the scanning model. However, the likelihood that there was a flaw in the underlying conceptual model appeared to be a more likely explanation for the above results. This is because prior studies, dating back to the late 60s and early 70s, also produced inconclusive results with respect to the identification of a set of significant associations between the key independent variables above and scanning practices.

This research confirmed that scanning is not particularly sensitive to the types of independent variables that have been tested so far. Therefore, it seemed reasonable to conceptualise that managers develop scanning routines or embedded work patterns that become well established and are not readily influenced. This prompted a line of research enquiry to understand the embedded managerial scanning behaviour further before considering the implications on effective scanning practices, and then revisiting the unresolved issue of what may significantly influence scanning behaviour.

In order to develop further insights into scanning behaviour, an analysis of correlations among major scanning elements was undertaken. As represented in the theoretical model in Figure 11, the major scanning elements comprised behaviour, attention, sources, and time. The correlation analysis specifically examined correlations among the following labeled sub-elements: *formality*, *personal*, *incompleteness*, *breadth*, *market*, *chain*, *specialist*, *network*, *internet*, *media*, *personnel*, and *time* ($r = |0.004 - 0.376|$). Refer to Appendix N, Correlations among scanning behaviour elements, to review the full correlation matrix. Some comments on the key correlations are as follows.

As can be seen in the correlation matrix, there were correlations between scanning behaviour scale 1, *formality*, and almost all other sub-elements in the areas of scanning attention, scanning sources, and scanning time ($r = |0.068 - 0.246|$). Of these, the only sub-element that did not show a significant relationship to *formality* was the traditional *media* source. A potential explanation for this result is that an individual with a high degree of formal planning concerning scanning is likely to deliberately identify and pay attention to a range of environmental sectors (i.e. covering the areas associated with the sub-elements of *market*, *chain*, and *specialist*); utilise a portfolio of alternative sources such as *network*, *internet*, *media*, and *personnel*; and be *time* intensive. An approach that utilises multiple scanning characteristics (in this case the two characteristics of *formality* and *personal*), pays attention to a broad spectrum of environmental sectors, and draws on multiple sources is an approach that arguably provides a richer pool of information from which to identify and analyse environmental changes. This portfolio type approach (as it utilises a wide range of scanning behavioural characteristics) would seem most likely to emerge from a formal planning process than alternative processes. Note that the correlation matrix cannot provide direct support for this proposition as it reflects correlations and not causal relationships. Nonetheless, the above explanation is consistent with the correlation data presented.

The second scanning behavioural characteristic, *personal*, is significantly correlated with the *network* source of information ($r = 0.256$, $n = 348$, $p < 0.001$). This is confirmatory of the validity of the *personal* scale as this characteristic is conceptually consistent with using personal networks of individuals outside a company.

It is interesting that the *incompleteness* characteristic is highly correlated with the *personal* characteristic (i.e. the preference to use personal sources and dialogue as the preferred means of both gathering information and assessing the significance of that information) ($r = 0.180$, $n = 348$, $p = 0.001$) and the *internet* source of information ($r = 0.149$, $n = 352$, $p = 0.005$). Both of these scanning elements, *personal* and *internet*, are

potentially very broad in the scope of information they may provide. Hence, it is understandable that they would be highly correlated to a sense of incompleteness (i.e. a lack of satisfaction with the type and quantity of information acquired). It is worth noting that the *incompleteness* characteristic was also the only characteristic highly negatively correlated with scanning *time* ($r = -.107$, $n = 355$, $p = 0.044$).

Unique to the scanning characteristic of *breadth* was its significant correlation to *media* sources (i.e. traditional mediums such as television, radio, newspaper, business magazines etc.) ($r = 0.261$, $n = 350$, $p < 0.001$). As may be expected, *breadth* was also significantly correlated with *time*.

An analysis of the correlation matrix also shows significant correlation among all of the attention scales, i.e. *market*, *chain*, and *specialist* ($r = |0.341 - 0.376|$). In other words, a high degree of attention to any of the three attention areas is likely to also be associated with a high degree of attention to the other two areas. Therefore, an interpretation is that either individuals are paying attention to the three key environmental sectors, or they are not!

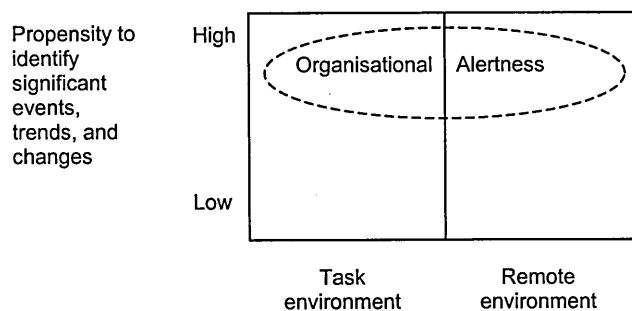
Further, if attention is being paid to the three areas of *market*, *chain*, and *specialist*, information is likely to be sourced from most of the core sources of personal networks, internet sources, traditional media and company personnel. For example, attention paid to *market* information was highly correlated with three of four sources – *internet* ($r = 0.202$, $n = 354$, $p < 0.001$), *media* ($r = 0.206$, $n = 354$, $p < 0.001$), and company *personnel* ($r = 0.153$, $n = 351$, $p = 0.004$). Attention paid to *chain* information was highly correlated with all four major sources – *network* ($r = 0.147$, $n = 334$, $p = 0.007$), *internet* ($r = 0.112$, $n = 335$, $p = 0.041$), *media* ($r = 0.127$, $n = 335$, $r = 0.020$), and *personnel* ($r = 0.240$, $n = 332$, $p < 0.001$). The third area of attention, *specialist*, was highly correlated with three of the four sources being *network* ($r = 0.112$, $n = 354$, $p = 0.036$), *internet* ($r = 0.154$, $n = 355$, $p = 0.004$), and *personnel* ($r = 0.139$, $n = 352$, $p = 0.009$).

In summary, from the conceptual model above in Figure 48, it is clear that the majority of associations between selected influencing variables and scanning behaviour were weak. These variables were shown to be remote in terms of their influence on scanning behaviour. As the influencing variables tested for were remote, there were few obvious mechanisms to use to influence scanning behaviour. This led to a research focus on better understanding individual scanning practices themselves and the associated behavioural biases. The scanning behaviour of an individual manager may be considered to be embedded as part of their work routines. If scanning behaviour is embedded as an established routine then the development of scanning practices and systems should account for these established behavioural biases.

Effective organisational scanning practices need to utilise embedded behaviour

Some consideration was given to the potential implications of different scanning behaviour on overall organisational alertness. Organisation alertness implies an ability to identify potentially significant events and trends in both the immediate task environment and the remote environment. This is reflected in the below Figure 49.

Figure 49: Organisation alertness: propensity to identify significant changes in the task and remote environments.



The left part of the figure represents the task environment or the immediate environment to the organisation. The task environment encapsulates the organisation's environment and its immediate external environment. For example, the type of information that resides in the task environment may include information about your current company, trends within your company's industry, functional specialist information, competitor companies, customer companies, joint venture or alliance partners, supplier companies, and information about your prior employer company.

The right part of the figure represents the remote environment. This environment extends beyond the individuals, entities, and information types that managers would ordinarily be exposed to in performing their roles. For example, the type of information that resides in the remote environment may include macro level economic information; regulatory, governmental, and legislative information; major business leader commentaries; emerging technologies with potential to impact business; innovation in a competing product or service; management techniques; and spending priorities of other companies.

The above examples of types of information associated with either the task environment or remote environment are not intended to be definitive. Indeed, it may be more useful to conceptualise the below model in terms of a continuum of scanning perspective. The narrowest perspective is the task environment comprising internal information concerning the organisation's effectiveness. The broadest perspective is the remote environment comprising distant events with no obvious immediate impact on the localised business environment.

Some consideration was then given as to what effective scanning practices would result in high organisational alertness. Based on insights from this research, a set of four scanning practices were proposed that may contribute to high organisational alertness. The first effective scanning practice is interpretative ability. The results of respondent feedback to Q11) and Q12) of the survey indicate that managers differ in their interpretative abilities and the ability to process and manage large volumes of data. Regardless of whether the task environment or remote environment is being scanned, a critical skill is to ability to derive meaning from data and to discern strategic from non-strategic information. This may require a confidence in the ability to absorb and process large volumes of information. It is also likely that a high interpretative

ability would be coupled with an orientation to scan externally, beyond the organisational information environment, and broadly. A manager with high interpretative ability is likely to think that data or information by itself can be important even though it is not recognised as relevant to some particular purpose. This type of ability contributes to an organisation's sensing capability. This competence may be conceived of as a dynamic capability which addresses an organisation's ability to adapt to changes in high velocity environments (Brown & Eisenhardt, 1997; Eisenhardt & Martin, 2000).

The second effective scanning practice is environment sector coverage. As significant events and trends may emerge from different sectors of the environment, it is necessary to gather adequate information across all sectors to maintain a high level of organisation alertness. Some sectors (and some environments) may be more dynamic than others and require additional scanning attention. These sorts of considerations are discussed in the next section below, titled Organisation alertness, performance, and environmental dynamism. Nonetheless, a base level of information is required across all environmental sectors. This implies that organisations are clear on what environmental sectors are pertinent to them, that a minimal level of coverage is provided to all sectors, and that specific tactics to rank the most important sectors requiring greater scanning attention are in place. Research by Daft, Sormunen, & Parks (1988) suggests it is the environmental information sectors of highest perceived strategic uncertainty that warrant greater focus and scanning attention.

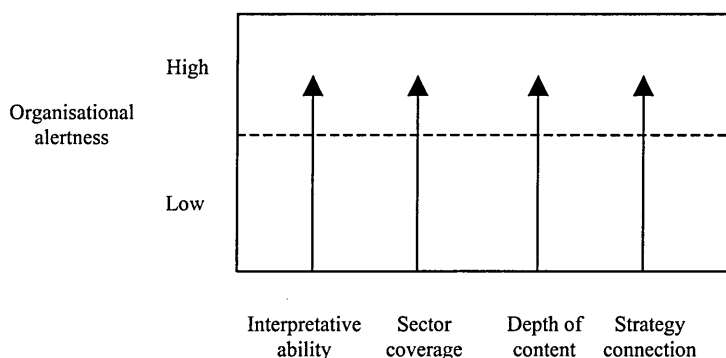
The third effective scanning practice concerns depth of content. While environmental sector coverage is a necessary condition for effective scanning, it is not by itself sufficient to ensure effective scanning. It is also necessary to gather sufficient depth of information for each sector. The determination of the adequate depth of information required by sector is a discretionary decision to be made. In order to do this, it may be helpful to adopt a formal and structured information gathering effort linked to specific business scanning objectives. In order to get sufficiently in-depth information, it may be helpful to utilise many and varied sources of information. An important skill in obtaining sufficient in-depth information would be the ability to categorise data at the information topic level. This would help to formally and efficiently identify information obtained and information outstanding. To gather adequate in-depth information, it would also appear helpful to be able to change how information is gathered according to different circumstances.

The fourth effective scanning practice proposed is to ensure that scanning efforts are connected to strategy formulation efforts. Scanning is a critically important activity within the strategy process. When managers misinterpret changes in their environment or fail to notice changes that turn out to be important, they may not make needed adjustments to an organisation's strategy or structure (Pfeffer and Salancik, 1978). Unless managers leverage their scanning activities to impact upon business strategy, there will be an increased risk of strategic drift (Johnson, 1988). The exact way in which scanning practices should connect with strategy processes will differ based largely on the strategy process. A formal strategy process would imply a different set of activities to incorporate scanning outputs, than would be implied by a visionary or

emergent strategy process. How scanning outputs are to be converted into strategy inputs needs to be determined by taking some account of the organisational context.

By way of a graphical summary, these four effective scanning practices that contribute to organisational alertness are illustrated in the below Figure 50.

Figure 50: Effective scanning practices and organisational alertness.



In order to implement these four effective practices, it is necessary to firstly diagnose the embedded behaviour of a set group of managers in the organisation that may be effective scanners, and/or are influential in setting business strategy. The results of the research to date have shown that simplistic prescriptions concerning scanning are unlikely to work as scanning behaviour may be embedded and resistant to change. Therefore, a diagnostic approach is recommended in order to firstly identify the type of embedded behaviour, and then secondly determine how to utilise this embedded behaviour as opposed to trying to change it.

Based on the elaborated scanning model, identifying significant aspects of embedded scanning behaviour involves measuring an individual manager's scanning behaviour, scanning attention, scanning sources, and scanning time. Scanning behaviour should be measured in terms of the four dimensions labelled *formality*, *personal*, *incompleteness*, and *breadth*. Scanning attention should be measured in terms of level of attention paid to *market*, *chain*, or *specialist* information. Scanning sources should capture the frequency of referencing four major sources of *network*, *internet*, *media*, and *personnel*. Scanning time can be expressed in terms of hours spent scanning per week. This should at least provide some base level information on the major dimensions of scanning.

Once this information is obtained, an assessment can be made as to whether the measured attributes contribute to achieving and implementing the four effective scanning practices. For example, a manager with high measured scores on the dimensions of *personal*, *breadth*, and *network*, who pays attention to a wide range of information (i.e. *market*, *chain*, and *specialist*), may be suited to play a key role in the interpretation of data and discerning meaning that is helpful to setting strategy. A further example is that a manager with high scores on the dimensions of *breadth* and *incompleteness*, who also pays attention to a wide range of information (i.e. *market*,

chain, and *specialist*) may be well suited to ensure that the organisation's scanning efforts are sufficiently wide so as to cover all environmental sectors (i.e. fulfill the role of environment sector coverage). A further example is to consider whether a manager who extensively utilises a wide variety of sources (such as *internet*, *network*, *media*, and *personnel*), is a good candidate to ensure that sufficient depth of information is obtained on certain information topics. Information topics that could be identified and defined by other managers substantially involved in interpretative functions, coverage assessment, or by general management based on a hunch. The point here is that it is unlikely that any one manager will be the perfect scanning machine! Instead, it is far more likely that organisational alertness will come about through a team effort. This research suggests that a thorough understanding of individual managers' scanning biases or embedded behaviours, will enable members of the team to be carefully selected for scanning roles that leverage their existing embedded scanning routines.

In summary, this research suggests that improving scanning effectiveness may result from increasing individual managers' awareness of their scanning routines, developing managers' knowledge of the effective scanning practices that lead to high organisational alertness, and working with and not against those embedded scanning routines to successfully implement effective scanning practices.

Organisational alertness, performance, and environmental dynamism

While this research did not focus on the scanning performance link, it has been the subject of prior research and an important area to finally comment upon. Daft, Sormunen, & Parks (1988) undertook an empirical study that was unique in that it analysed for differences between scanning characteristics of chief executives in low and high performance firms. Their unique contribution was an attempt to link certain types of scanning practices ultimately to firm performance. Although the respondent population in their research was not as broad as this research which extended to the top 3 tiers of management, the results are still pertinent. Particularly interesting is an inference that effective scanners do not limit their scanning to the narrow task environment only. Daft, Sormunen, & Parks (1988) report that a distinctive feature in high-performing firms was the CEOs response to sectors such as "sociocultural" in the general environment. They reported that the significance of this finding may be that chief executives of successful firms do not form their impressions based strictly on narrow task environment data as they might miss opportunities, trends, problems and other issues that could provide input for incremental adjustments in strategy.

An apt proposition between scanning and performance that serves to help justify the above research into the practice of scanning was offered by Daft, Sormunen, & Parks (1988:136) as follows: "Scanning and performance may thus be self-reinforcing, with broad scanning providing opportunities for improved performance, and improved performance providing slack resources for broad scanning. Scanning the less well understood sectors may contain weak signals about future developments. Learning about uncertainties across all sectors may provide a richer information display for the incremental decisions needed for strategy formulation."

Some considerations of the impact of environmental dynamism on scanning practices, using some of the concepts that emerged in the new elaborated scanning model, are as follows. In a stable environment, it may be more likely that organisations would continue to support routine scanning that was broad in its coverage but potentially limited in depth of information; there may be greater reliance on available information sources (such as company personnel, media etc.); and only intermittent feedback of scanning findings may be made to management impacting on strategy. In a dynamic environment, a different approach to scanning would seem appropriate. This approach is likely to be formal and concerned to develop information gathering and interpretative capabilities; it may utilise responsive and information rich sources such as personal networks etc.; effort may be spent to specifically identify the environment sub-sectors most associated with uncertainty which would become scanning priorities; and there may be more frequent communication to the team responsible for setting and implementing strategy.

An extension to this proposition could be to develop and test an argument that more specifically identifies which environmental sectors to focus on under differing environmental conditions. In other words, to develop an argument that incorporates dynamism and complexity of environment, organisational adaptiveness, and performance. Some recent relevant research suggests that the pertinence of a particular environmental sector does depend in part on the overall level of dynamism in the external environment facing the firm (Garg, Walters, & Priem, 2003).

8.2 Limitations of Research

An appreciation of the stated contribution of this research outlined above should also sensibly be balanced by acknowledging some limitations applicable to this research.

The first limitation occurs by default through adopting one philosophical perspective; in this case a realist perspective. Adopting this perspective equated to adopting a view of social reality that accepts there are fundamental differences between natural and social phenomenon and that social reality is pre-interpreted and produced and reproduced by its members. The realist ontology assumes that the ultimate objects of scientific inquiry (in this research, senior managers) are considered to exist and act independently of scientists and their activities. The realist ontology that underpinned the research methodology reflected a desire to remain independent of the research subjects and an assumption that this was possible. Clearly an alternative philosophy, for example a more interpretative perspective, may have led to a more qualitative methodology which would have made a different natured contribution. Hence, the findings of this research must be positioned as just one set of findings underpinned by a set of assumptions on the nature of knowledge and how to enquire into that knowledge.

A second limitation concerned the influence of the researcher in the pilot studies. In the pilot studies a semi-structured interview was used to gather information on the “what, where, and how” of scanning behaviour. The very nature of asking a series of open-ended questions, the type of questions asked, and the order the questions may have influenced the respondents. For example, asking a question on what sectors of the

environment a manager pays attention to automatically prompts the notion of environmental categories which may in turn influence how a manager responds. While due care was given to the construction of the semi-structured questionnaire, and the questions were carefully constructed to be as open-ended as possible, it is acknowledged that the presence of the researcher and research design is likely to have impacted on the responses at some level.

A third limitation is the possibility that there is a difference between “espoused theory versus theory in practice”; in other words a risk that what respondents report differs from what is practised. Many situational factors such as appearance of rationality, instinctive responses, changes in priorities etc. may create a difference between espoused theory and theories in use. This may be applicable to scanning which represents a basic behavioural aspect of managers’ activity and is not always done with conscious awareness. Hence, the very process of making explicit an otherwise second natured practice may introduce inherent inaccuracies. While methodological efforts were made to minimise espoused versus in-practice differences (Waller, Huber, & Glick, 1995), when researching aspects of interpretation it should be expected that some imprecision will result and must be accommodated for in subsequent analysis (Daft & Weick, 1984).

The fourth limitation concerns sampling biases. The sample of managers who responded to the online survey would ideally be perfectly representative of the managerial population. One bias to acknowledge is that obviously the data collected is from managers who chose to respond to the invitation to complete the survey; the very fact that they responded positively biases the sample toward that type of manager. The second bias concerns the mix of respondents with post graduate qualifications in business and management. As the sample, in part, utilised some target sample lists of individuals who were known to have post graduate qualifications, the survey respondent profiles were skewed. Of the overall respondents, 294 had qualified from a post graduate course of study in business and management, and 100 of the respondents did not. The number of non-graduates was sufficiently high that a series of valid statistical tests just on that population alone could be made. More importantly the number of non-post graduates was sufficiently high that many chi square tests comparing the results of post graduates with non-post graduates could be done. Nonetheless, when analysing the overall results, a skew of two thirds post graduates to one third non-post graduates should be kept in mind. For a full discussion of sampling bias, refer to Section 5.3, Research Design Issues.

A fifth limitation worth separately noting concerns the use of certain single item indicators underlying some of the reported results. In particular, it is important to be aware that respondents were categorised into one of four scanning modes (i.e. undirected viewing, conditioned viewing, informal search, and formal search) based on a single item survey question (i.e. Q17, Scanning Modes). These categories were then used in chi-square tests to identify any significant effects of individual experiential and organisational contextual variables on scanning modes (refer to Section 6.2.1, Scanning Mode Adoption). These categories were also used in a set of chi-square tests to identify associations between strategy process and scanning mode (refer to Section 6.2.3, Strategy Process and Scanning Mode). The scanning mode categories were

useful as a proxy to differentiate among managers' scanning behaviour. However, this single item indicator of scanning has indeterminate reliability and therefore it is unclear as to how much confidence to place in certain of the results. Indeed, this uncertainty lead to the adoption of principal components analysis concerning scanning behaviour and scanning attention which utilised multiple item indicators upon which greater reliance could be placed. A further case of using single item indicators occurred when capturing information on strategy development processes (i.e. Q13, Strategy Process). Three different types of strategy development processes (i.e. visionary, planning, and emergent) were operationalised based on individual single statements describing each of these three types of processes. A further example of single item indicators occurred when capturing information on the frequency of use of four major sources of information – personal networks, internet sources, traditional mediums, and company personnel (i.e. Q14, Sources). Information on the frequency of use of each of these four sources was captured using four individual single statements in the survey. The justification for using the above single items indicators was to reduce the length of the survey. The survey attempted to coverage a wide range of scanning activity covering how managers gather external business information, what external business information managers pay attention to, and where managers source external business information from, which implied a lengthy survey. Efforts were therefore made to reduce the survey length resulting in the use of the above single item indicators. Even after these efforts, the survey was still substantial comprising 18 questions which required respondents to register 107 individual bits of information.”

Other limitations concerning the operationalisation of variables were substantially overcome through using similar constructs and variables used in prior scanning studies and using a survey methodology which has also been traditionally used in this field of study. Of course, the survey method does preclude being able to capture data on the internal contextual aspects of an organisation that may well influence scanning behaviour. While these aspects were not and could not be reported on in this research, there were not any obvious *a priori* assumptions concerning organisation context that were immediate priorities for this research, which was substantially concerned with generally bringing the field up to date on the status of scanning behaviour. Finally, generalisability was considered. As the majority of the sample were UK based managers it seems clear that there are limits on the generalisability to other countries.

8.3 Managerial Implications

Understand biases in managerial scanning behaviour

Managers would benefit from understanding that individuals appear to develop their own set of scanning routines or ways of gathering external business information, monitoring the environment, and making sense of it. This research revealed some significant scanning behaviour traits related to general scanning behaviour (i.e. *formality, personal, incompleteness, and breadth*); what managers pay attention to (i.e. *market, chain, and specialist*); where managers source information from (i.e. *network, internet, media, and personnel*); and *time* spent scanning.

Work with and not against managerial scanning behavioural biases

This research suggests that there are not many determinants of managerial scanning behaviour per se. Therefore, if top management want to influence the managerial scanning behaviour within their organisation they would be advised to not simply attempt to impose some scanning practices or systems. Instead, top management should develop a set of scanning related roles and responsibilities that work in accordance with and take advantage of inherent managerial scanning biases. For example, managerial scanning biases in terms of sectors paid attention to, frequency of scanning efforts, short-term versus long terms perspective, variety of sources used, extent of external networking etc. should all be taken into account when designing organisational scanning practices.

Support a mix of scanning behavioural profiles in your organisation

Different managers have different strengths and weaknesses with respect to scanning. For example, a manager may adopt a particularly formal approach to scanning which may result in him or her being more thorough in information gathering efforts. Some managers may utilise personal sources more than on average, and tap into valuable networks of individuals that may help not only gather scarce information but also obtain useful insights. Managers should take these strengths and weaknesses into account when developing their scanning practices or policies. Arguably, every managerial team should include individuals that have competencies in a variety of areas that enable effective scanning practices of interpretation, wide sector coverage, depth of information, and connection of scanning output to strategy formulation. For a discussion of these effective scanning practices and how they may be supported by various embedded scanning behaviours refer to Section 8.1, Summary of Contribution.

Allocate scanning resources to cover the fifteen environmental sectors

Given that there was link between individual experiential variables and contextual variables and attention paid to various of the fifteen environmental information sectors, it is possible develop a preliminary map of where various managers are directing their scanning attention. This could also be more accurately assessed through direct discussions and observations with each member of a management team. This exercise would identify where current scanning activity is currently being directed. An exercise to then determine which environmental sectors should be monitored and with what degree of scrutiny could also be undertaken. This may be achieved through assessing which environmental information sector is equated with what degree of perceived strategic uncertainty. Reflecting on the criticality of environmental sectors, the associated assessed levels of perceived strategic uncertainty, and the actual current level of attention directed at each sector would enable a gap assessment of sorts. The gap between sector importance and sector scanning attention could then be actively minimised. Different profiles of scanners with different natural orientations to different sectors (based on their relevant individual experiential and contextual variables) could then be consciously directed to scan a particular sector to a predetermined level of scrutiny. In addition, strategic uncertainty is likely to exist at some level across all of

the sectors. Hence, orientating scanning resources so that all the sectors are scanned to some level, and to avoid overly focusing on just a few sectors would seem prudent.

Selectively use managers external to your organisation

Expanding the mix of scanning profiles of managers to include individuals who reside outside the organisation may be beneficial for some information gathering objectives. For example, this research shows that managers in the financial services industry pay a significantly higher degree of attention to macro-level economic information than managers from any of the other industry groups. If the environmental sector “macro economic” became a high priority information sector then gaining insight from a financial services manager may be a preferred course of action to attempting to develop the requisite scanning interpretative skills particular to that information domain. This implication is concerned with achieving heterogeneity in scanning practices through involving individuals beyond an organisation’s local industry i.e. increasing an organisation’s social capital.

Make explicit scanning orientated roles and responsibilities

In many cases, scanning effort and specific attention to various sectors were influenced by formal job roles and responsibilities. Business objectives should be clearly set with respect to areas of information that managers are expected to be familiar with in order to guide scanning attention. Further specific objectives that are directly scanning related should also be considered. These could include identifying specific sectors on which to focus, stating the degree of interest to be applied to this sector, determining the frequency with which to scan for related information, and the form of feedback or communication that will result from the scanning effort (formal or informal).

Utilise a variety of different sources

A review of the concept of “richness” of information suggested that sourcing information from multiple sources rather than over reliance on a few select sources may result in higher quality insights. Suggested information mediums to utilise include the internet sources including search engines, company websites, email information subscription services; personal networks of individuals outside your company; traditional mediums such as television, radio, newspaper, business magazines etc.; and company personnel such as superiors, peer, and subordinates. Formal providers of external business information such as external consultants, external market research professionals, and external industry commentators may also prove valuable as complementary information sources. Managers are advised to assess the current sources collectively used by the organisation and to diversify source usage where possible. A starting point again is to consider the inherent behavioural characteristics of different profiles of scanners.

Align scanning activities with organisational strategy

Some limited evidence emerged of a link between an organisation adopting a strategy planning process and the adoption of formal scanning mode among its managers. More

generally, an implication for managers of this research is to consider how the scanning outcomes and insights input into their organisation's strategy process. It seems reasonable to assume that the type of input, the forum for input, and the frequency of input would vary depending on the extant strategy process. Examples of different strategy process discussed in this research included visionary, planning, and emergent. The research encourages managers to consciously consider how to integrate scanning insights into the strategy process; this may not necessary require a formal process (e.g. a visionary strategy process may be informally driven) or for a raft of procedures to be documented (e.g. an emergent strategy process may well evolve through incremental changes in ways of doing things versus documented deliberations), but management should design and consistently explain how their scanning outcomes ultimately impact upon managerial decision making and strategic insight.

8.4 Implications for Further Studies

Reflecting on the contribution and limitations of this research resulted in identifying a series of implications for further study. Some of the major implications and directional comments concerning further research are stated below.

Alternative influencing variables – personality characteristics and learning styles

As outlined above, the associations between the majority of influencing variables tested and scanning were weak. Specifically, the associations between experiential and contextual variables and scanning modes were weak as were the associations between experiential and contextual variables and the sources of information used by managers. In this research, the only one area in which influencing variables were significantly associated with a component of scanning behaviour concerned what managers pay attention to.

It was hypothesised that these results reflected a conceptual flaw i.e. conceptually there is no a strong rationale for expecting that the influencing variables tested would actually significantly influence scanning behaviour, or a methodological flaw concerning operationalisation of the variables i.e. what was being measured did not represent what was intended to be measured. It is this potential conceptual flaw that prompted some thoughts of an alternate conceptual model that has implications for further research. Rather than assuming that the influencing variables were conceptually related to scanning behaviour, an alternative view was that an alternate set of independent variables were more strongly related to scanning behaviour.

Alternative influencing variables to consider are those more closely associated with individual behavioural traits. If scanning is a highly individualised behaviour then it may follow that variables more closely associated with behavioural traits and individual development may be more valid determinants of scanning behaviour than those tested in the research. A short discussion of these alternative influencing variables and resulting propositions for further research now follows.

Personality characteristics

The first category of alternative influencing variables considered was personality characteristics. There are many theories of personality, and ways of categorising and describing different types of personality. In the management field personality typing or testing is often used in selection, assessment and training situations, and a variety of techniques have been used, each drawing on particular theoretical underpinnings. A widely used diagnostic device is the Myers-Briggs Type Indicator (MBTI; Myers, I. & Briggs, K. 1975). The MBTI personality assessment tool indicates a person's likely psychological type. Psychological type, sometimes called personality type, describes the different ways people prefer to take in information; prefer to make decisions; are energized by the outside world or by the inner world; and prefer to keep things open or to move towards closure. The MBTI research encapsulates the ways that people prefer to take in information in general and would therefore seem relevant to the specific phenomenon of scanning behaviour.

The theory of psychological type says that people with different preferences naturally have different interests, perspectives, behaviours, and motivations. Proponents of the MBTI assessment tool stress that all preferences are equally valuable and each type brings an important perspective to human interactions. They claim that for this reason, a mixture of types tends to lead to the most effective work in groups. This insight would seem to have implications for effective scanning. If managers differ in their scanning behaviour through sourcing different types of information, exhibiting different scanning characteristics, and paying varied degrees of attention to environmental sectors, then an appreciation of these differences and utilisation of a mixture of scanning behaviours may result in higher overall organisational alertness.

The MBTI assessment tool itself is based on a framework of four pairs of preferences. How individuals rate along these preferences indicates tendencies in their attitudes towards engaging with the world. The four pairs of preferences are as follows:

1. Direction of energy and attention: Extraversion (E) and Introversion (I) indicates how a person is energized. Do you naturally turn to the outer world of people and things (Extraversion) or to the inner world of ideas and images?
2. Perceiving: Sensing (S) and Intuition (N) describe how people like to take in information and what kind of information they tend to trust. In other words, do you notice and give more weight to information that comes in through your five senses (Sensing) or do you give more weight to information that is assigned meanings and patterns (Intuition)?
3. Judging: Thinking (T) and Feeling (F) describe how a person likes to make decisions about the information taken in using either Sensing or Intuition. Do you give more weight to objective principles and impersonal facts (Thinking) or to personal human concerns and people issues (Feeling)?
4. Orientation to the outer world: Judging (J) and Perceiving (P). All people use their Perceiving preference and their Judging preference in normal daily activities but prefer to use one more than the other. In dealing with the outer world, some people tend to spend more time in a structured planned mode because they prefer

Judging or decision making. Others spend more time in a flexible adaptive mode because they prefer Perceiving or taking in information.

The Thinking-Feeling dichotomy and the Sensing-Intuition dichotomy are called mental functions since they refer to the workings of the mind, while the Extraversion and Introversion pair and the Judging-Perceiving pair are called attitudes, since they relate to a person's orientation to the world.

The preferences of each of these four scales combine to yield a person's four-letter psychological type contributing to sixteen different type descriptions. The commentary around the MBTI assessment stresses both type dynamics – the powerful interaction among the preferences – and type development – the process of trying out and becoming comfortable with non-preferences over time. A full exploration of these concepts is beyond the scope of this discussion concerning alternative influencing variables upon scanning behaviour. Nonetheless, it is mentioned to alert us to some additional complexities such as the existence of dominant functions and auxiliary functions; the potential changing of certain types of preferences over time; and of variance from true types due to social pressure, family dynamics, culture, and work environment. This last complexity referring to falsification of type is of particular interest. Falsification of type can lead to stress, conflict with others, and frustration, particularly when the person is unaware or not accepting of his or her natural type. This research found that many expected influencing variables (e.g. function, size of company, industry etc.) did not significantly influence scanning behaviour. This may be due to managers preferring and relying on their 'natural' scanning behaviour preferences which alleviates any otherwise felt stress or frustration. In other words, scanning is an individual embedded routine that ultimately reflects the managers own preferred way of learning about the business environment.

Since the publication of the MBTI instrument for applied use in 1975, the tool has been used in many applications and research within the business field. In the business context, the MBTI has mostly been used to help colleagues and co-workers understand their type as a precursor to improving the effectiveness of working in groups. To date, in the strategic management literature, the MBTI has not been specifically considered with respect to scanning behaviour (refer to Appendix I. Table summarising the key features of 13 major research studies relevant to scanning and interpretation). As stated in the literature review (refer to Section 2.2.4 Influences on Scanning Behaviour), the scanning studies to date have concerned individual perceptions (i.e. environment as hostile, sense of organisational identity, extent of decentralisation, strategic uncertainty, organisational effectiveness) and individual job characteristics (i.e. tenure, hierarchical level, functional speciality, multi-national company influence, manager's level of experience), and not specifically individual personality types with respect to information processing preferences.

Initial consideration of the potential relationships between the MBTI types and scanning behaviour prompted the following thoughts. It seems that a person's attitudes or orientation to the outside world would influence scanning behaviour. In the MBTI assessment, the Extraversion and Introversion pair and the Judging-Perceiving pair are called attitudes. The first of these attitudes concerns the direction of energy and

attention indicating how a person is energised. In other words, do they naturally turn to the outer world of people and things or to the inner world of ideas and images. If a manager's preferred type is Extraversion rather than Introversion, it may follow that they prefer to engage with people and that dialogue and interaction may be a preferred means of sourcing ideas and information. It may also follow that they are more likely to develop external personal contacts and networks, i.e. external networks beyond company personnel. Hence, a manager's preferred type with respect to Extraversion and Introversion may influence their scanning characteristics (i.e. in particular their preference to gather information informally through personal sources and engage in dialogue), and their information sources (i.e. a higher than average use of networks and company personnel).

Hence, the first proposition linking an aspect of the MBTI assessment tool to scanning behaviour (with reference to scanning characteristics and information sources) is as follows:

P1: Managers with a preference to Extraversion will gather more information informally and through dialogue utilising personal sources, and source more information through external personal networks and company personnel, than managers with a preference to Introversion.

Conversely, managers whose type is more Introverted are likely to utilise personal sources less than average. Their tendency may be to engage with people less and seek out and use sources of information other than personal sources, such as the internet and traditional media sources. Hence, proposition two is as follows:

P2: Managers with a preference to Introversion will gather less information informally through personal sources and dialogue, and are more likely to utilise the internet and traditional media sources, than managers with a preference to Extraversion.

The second attitudinal dimension of Judging and Perceiving also has the potential to influence scanning behaviour. When dealing with the outer world, some people spend more time in a structured planning mode because they prefer Judging or decision making. This preference toward Judging may influence the degree of formality that a manager adopts when scanning. A manager with a preference to Judge may adopt a more formal and systematic approach to scanning than otherwise. Hence, proposition three is as follows:

P3: Managers with a preference to Judging will adopt a more formal and systematic approach to scanning than managers with a preference to Perceiving.

So far, the above considerations of alternative influencing variables on scanning behaviour have been limited to the MBTI attitudinal types (i.e. the Extraversion-Introversion pair and the Judging-Perceiving pair). Prior to testing these propositions an additional exercise would be needed to establish whether any aspects of scanning behaviour (as defined in this research) are already incorporated into the MBTI assessment tool. Now, some further consideration is given to the other two MBTI types: the Sensing-Intuition pair and the Thinking-Feeling pair. The first two functions

are used for information gathering, i.e. *sensing* is perception of details and current realities function, and *intuition* is perception of patterns and future possibilities. The second two functions are used for organising information and for making decisions, i.e. *thinking* involves making decisions based on principles and logical consequences, and *feelings* refer to decisions based on values and consequences for people. These pairs are called the mental functions as they relate to the workings of the mind.

Upon initial reflection, these “mental functions” would seem directly relevant to scanning behaviour as they relate to information processing. While it is possible to start to derive some potential relationships between these type pairs (i.e. sensing and intuition, and thinking and feeling) and scanning behaviour (e.g. a preference to the thinking versus feeling type may be associated with a higher degree of systematic scanning behaviour), there are also many instances where the potential relationship to scanning behaviour is less clear. For example, the relationship between the *feelings* type versus thinking type and scanning attention and scanning sources is difficult to surmise. Perhaps the difficulty ensues as the mental function dichotomy between thinking (i.e. making decisions based on principles and logical consequences) and feelings (i.e. making decisions based on values and consequences for people) is very subtle and not readily relatable to the more obvious attributes of scanning behaviour identified in the Scanning Model as represented in Figure 47. Further, it is not obvious as to what attributes of scanning behaviour may be more impacted by *intuition* versus *sensing*. For these reasons, an alternative scheme of behaviour that embodied more practical elements of information processing was sought as the basis for further propositions. As above, an alternative scheme that meets this criteria and generally relates to individual development is learning style.

Learning styles

Arguably, learning styles provide a more specific description of the scenarios of sourcing information and engaging with ideas and people that may be related to scanning behaviour than the two mental functions of the MBTI assessment. There are many learning theories forming a wide body of learning research. An examination of these is beyond the scope of this initial discussion on learning styles. Instead, this discussion will focus on a particular approach that is popular in the management field and readily operationalisable which was developed by Honey and Mumford (1982). Their learning type descriptions specifically distinguish between perspectives of learning, degrees of pragmatism, links to implementability, and preferred modes of sourcing information. These types of attributes seem well suited to help us to understand “the how” of scanning, i.e. the ways in which managers gather information and accord it meaning, or learn.

The term “learning styles” is used as a description of the attitudes and behaviours that determine our preferred way of learning (Honey and Mumford, 1982). Learning style preferences determine the things that people learn and the ease with which they learn them. They exert a hidden influence on learning effectiveness.

Honey and Mumford's (1982) model identifies four types of learning preferences:

- 1) Activists – “I like to have a go and see what happens”;
- 2) Reflectors – “I like to gather information and mull things over”;
- 3) Theorists – “I like to tidy up and reach some conclusions”; and
- 4) Pragmatists – “I like tried and tested techniques that are relevant to my problems”.

A brief overview of each of these four learning preference styles is as follows. Activists have an open-minded approach to learning and like to be involved in new experiences. They are enthusiastic about new ideas but get bored with implementation. They enjoy doing things and tend to act first and consider the implications later. They like working with others but tend to grab most of the attention. Activists learn best when they are involved in new experiences, problems and opportunities; work with others in business games, team tasks, and role playing; receive very difficult tasks; and chair meetings and lead discussions. Activists learn less when they are listening to lectures or long explanations; when they are reading, writing or thinking on their own; absorbing and understanding data; and following precise instruction to the letter.

Reflectors prefer to stand back and view experiences from a number of different perspectives while collecting data and taking time to work towards an appropriate conclusion. They enjoy observing others and will listen to their views before offering their own. Reflectors learn best when observing individuals or groups at work; reviewing what has happened and thinking about what they have learned; and producing analysis and reports and doing tasks without tight deadlines. Reflectors learn less when acting as leader or role-playing in front of others; doing things with no time to prepare; being thrown in at the deep end; and being rushed or worried by deadlines.

Theorists prefer to analyse and synthesise, drawing new information into a systematic and logical “theory”. They think problems through step by step. They tend to be perfectionists who like to fit things into a rational scheme. They tend to be detached and analytical rather than subjective or emotive in their thinking. They learn best when they are put in complex situations where they have to use their skills and knowledge; they are in structured situations with a clear purpose; they are offered interesting ideas or concepts even though they are not immediately relevant; and they have the chance to question and probe ideas behind things. Theorists learn less when they have to participate in situations which emphasise emotion and feelings; when the activity is unstructured or briefing is poor; they have to do things without knowing the principle or concepts involved; and they feel they're out of tune with the other participants who have different learning styles.

Pragmatists are experimenters, trying out new ideas and techniques to see if they work in practice. They want concepts that can be applied to their job. They tend to be impatient with lengthy discussions and are practical and down to earth sorts. Pragmatists learn best when there is an obvious link between the topic and the job; they have the chance to try out techniques and get feedback; they are shown techniques with obvious advantages; they are shown a model they can copy. Pragmatists learn less when there is no obvious or immediate benefit that they can recognise; there is no

practice or guidelines on how to do it; there is no apparent payback to the learning; and the event or learning is “all theory”.

According to the commentary on Honey and Mumford's (1982) model, most individual's have elements of more than one learning style. However, they usually come to prefer, and rely on, one style above the others. The opportunity to improve individual learning lies with identifying a strongest and weakest style and understanding the inherent resulting learning biases. The idea of a predominant style was advanced through Honey and Mumford's (1982) research. This idea evolved from Kolb's (1976) earlier research into learning styles that positioned learning as a continuum ranging across concrete experiences (being involved in a new experience); reflective observation (watching others or developing observations about own experience); abstract conceptualisation (creating theories to explain observations); and active experimentation (using theories to solve problems, make decisions). The research of both Kolb (1976) and Honey and Mumford (1982) provide insights into modes of information process and experiential learning. Both models appear directly relevant to informing us further on how information processing activity in the managerial context (i.e. scanning behaviour) occurs and may be influenced.

Potential relationships between the learning styles and scanning behavioural attributes are as follows. Activists and Pragmatists are both oriented to doing things and learn best when they are involved in new experiences and can try out techniques and get feedback. Therefore, the types of information they are likely to covet are those that can be translated into short term action. This may imply that their attention is orientated to localised and short to medium term trend information. Of the three scanning attention factors – *market*, *chain*, and *specialist* – it may be that Activists and Pragmatists afford more attention to *chain* as it is localised and *specialist* information as it is directly pertinent to current activities. *Chain* information is localised as it is information pertaining to outside entities with close links to a firm's operations on the supply side (i.e. suppliers) or demand side (i.e. customers). Therefore, a fourth proposition that links two learning styles to scanning attention is as follows:

P4: Managers with a preferred learning style that is Activist or Pragmatist will pay more attention to information regarding entities with close links to a firm's operations and specialist operational information, than managers with a preferred learning style that is Reflector or Theorist.

It is possible that learning styles may also influence the general scope of attention paid to information about events and trends in the business environment. Reflectors prefer to stand back and view experiences from a number of different perspectives while collecting data and taking time to work towards an appropriate conclusion. They learn best when producing analysis and reports and doing tasks without tight deadlines. The preference of Reflectors to adopt multiple perspectives and gather a wide range of related data, may suggest that they adopt a very broad interest in information about events and trends in the business environment. Theorists may be also drawn to a wide array of information as they are often interested in information, ideas or concepts even though they may not immediately fit into a systematic and logical theory. A by-product of a wide interest in business environment information may be a sense of

incompleteness i.e. a sense that there is more information that may inform on a particular business concern than has been gathered.

Proposition 5 links the preferences of Theorist and Reflectors to the scanning characteristic of *breadth* and *incompleteness* as follows.

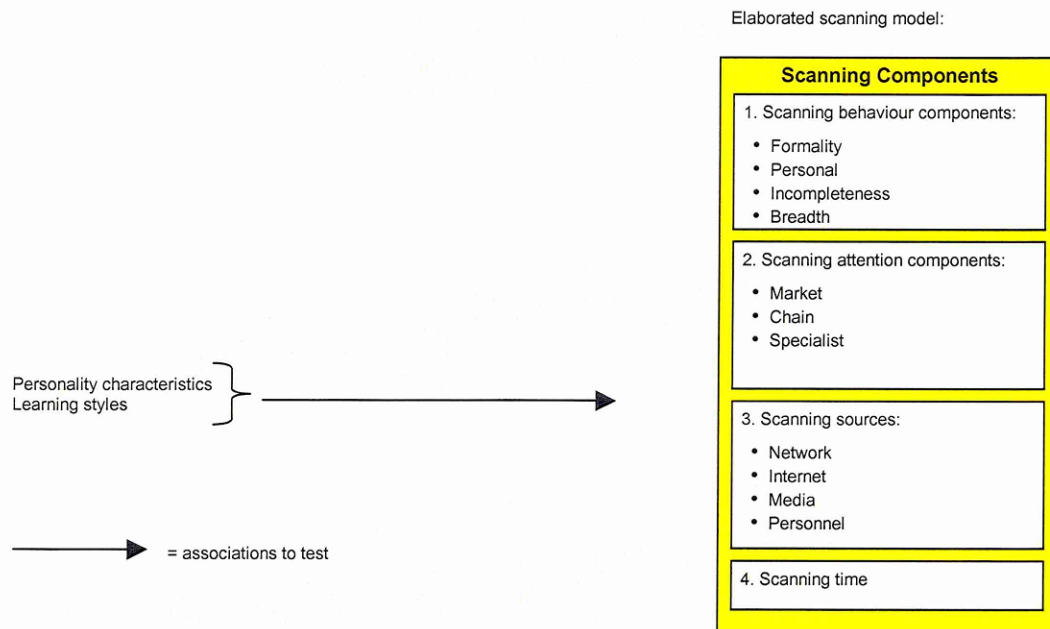
P5: Managers with a preferred learning style that is Theorist or Reflector will engage in a more general and broad exploration for information about events and trends in the business environment and will report a greater sense of incompleteness of desired information, than managers with a preferred learning style that is Activist or Pragmatist.

The above five propositions represent an initial set of propositions that might prompt further work. These propositions were developed based on the implications of the findings of this research. One significant finding was the scanning behaviour would seem to be an individualised and embedded behaviour. This prompted the development of a set of propositions that associated personality characteristics and learning styles with scanning behaviour. The above five propositions illustrate the types of associations that may be tested. Collectively, the above five propositions propose associations between personality characteristics and learning styles to all of the significant dimensions of scanning behaviour i.e. characteristics, attention, and sources. The above five propositions are not intended to be a comprehensive list, but merely an illustration of the types of propositions that could be the basis for further research. It is expected that a future research effort into the influences upon scanning behaviour could elaborate further on the above propositions and develop further related propositions.

The suggestion that scanning behaviour is persistent and embedded would be supported if both personality and learning styles were found to be strongly associated with scanning behaviour. Alternatively, the stability of scanning behaviour could be tested using longitudinal methods including tracking individual managers in different work contexts.

An overall model that illustrates the potential association between personality characteristics and scanning, and learning styles and scanning is presented in the below Figure 51. In this figure, scanning is represented on the right hand side of the model using the elaborated scanning model previously discussed.

Figure 51: Potential variables impacting on scanning behaviour.



Strategic fit

As discussed above in Section 2.3, Competitive Strategy, there is a theoretical basis to assume that top management would direct scanning towards those environmental sectors of key importance to the organisation's strategy. This is consistent with the recognition that organisations must adapt to their environments in order to survive and prosper. It follows that variance in adapting to environments may be attributable in part to differences in what top management know about their environments.

Despite the theoretical basis for a link between strategy and scanning there is very little empirical research on how environmental scanning practices of top managers relate to their organisation's means of competing, their strategies. While this research made a contribution to understanding how top managers currently scan, the analysis of the relationship to strategy processes was limited. This research tested for associations between three types of strategy processes – planning, emergent, and visionary – and scanning modes were conducted. The only significant interaction effect to emerge was between strategy process planning and scanning mode. Tests conducted on just top tier managers, did not identify any further strong associations between strategy process and scanning modes.

Research in this area could be improved and extended in a number of ways. First, a continued focus on the relationship of strategy process, as opposed to strategy content, and scanning would represent an incremental contribution to the field. As before, very few empirical studies have been done, and those prior studies have almost entirely focused on strategy content versus strategy process as the concept of interest. Second, the operationalisation of the concepts of strategy process could be improved beyond that used in this research. In this research, managers were categorised according to

whether they rated their organisation's strategy high, medium, or low for each individual strategy process (i.e. visionary, planning, emergent). This allowed for simple chi square tests to be run analysing the three sub-categories of responses (high, medium, & low) against any one strategy process (i.e. visionary, planning, & emergent) at any one time. An alternative operationalisation could attempt to identify those responses that strongly favour one type of strategy process over the other two types. This would produce a smaller number of managers that report a strong adoption of only one of each of the three strategy processes. This may lead to identifying more distinctive and stronger relationships. Third, a set of more specific propositions concerning the influence of a predominant type of strategy process on the scanning behaviour within the organisation should be developed. These propositions could build on those considered in this research by expanding the respondents of the study beyond the top three tiers of managers; specifically considering the relationships between the degree of perceived strategic importance, the degree of perceived strategic uncertainty for each environmental sector, and the strength of attention paid on a environmental sector basis; and considering the potential varying roles of different information mediums for each major strategy process.

It is also worth noting that the tests for relationships between strategy processes and scanning in this research were treated separately. This was due to three reasons. First, there was a difference in the underlying nature of the measures behind strategy process and the other independent variables (i.e. hierarchy, functional roles, age, cross functional experience, post graduate education in management, company size, and industry affiliation). The strategy process variable was based on an individual manager's subjective sense of how well various statements reflected their assessment of their organisation's strategy process, whereas other independent variables were independently confirmable. Second, there was a difference in the basis for categorising managers according to strategy process, versus the other independent variables. For the strategy process variable, the scores were grouped into three categories – low, medium, and high – based on allocating approximately one third of the sample into each category (i.e. relative categorisation). For the other variables, categories were mostly pre-determined based on methods adopted and tested in prior studies. Third, the tests concerning strategy process were based on a minimal amount of data. Due to survey length, only six statements were included in the scanning survey regarding strategy process. These six statements were modestly reflective of three types of strategy processes – visionary, planning, and emergent. A full exploration of the relationship between strategy process and scanning would benefit from using a multi-dimensional survey on strategy process or adopting an amended research design. The separate treatment of strategy process from the other independent variables influenced the actual tests undertaken, with the other independent variables being input into the multiple regression, and the strategy process tests being subject to ANOVA analysis. Future research, based on more robust data concerning strategy process, could include strategy process variables in the multiple regression analysis.

Inter-relationship of different information mediums

As per Section 7.2.6, Technology influence, a significant outcome was the ranking of the sources in terms of frequency of reference being internet sources, company

personnel, traditional mediums (television, radio, newspaper, business magazines) and personal networks of individuals outside the company. The other major contribution in this area resulted from a set of chi-squared tests that identified that size of company, hierarchy, scanning mode, industry, and MBA status were all significantly associated with choice and frequency of use of source. The reason for these associations was almost exclusively due to differences in internet usage versus other mediums.

Building off these results, an avenue for further research is to consider the inter-relationship of different sources of information. Of particular interest, given its ranking as an information source, is the inter-relationship between internet sources and other sources. Further research in this area could attempt to understand which media are used to gather tangible data about discrete events and which are more likely to be used as signals that may trigger the use of a complementary medium. It would seem possible to conceptually link information types and mediums used from the perspective of the individual scanning manager according to a few discrete scenarios (such as strategising, routine operations, budget planning, and event investigation). Depending on the outcome of such an effort, there could emerge the beginnings of a contingency model of strategic information gathering and assessment.

Organisational perspective and link to performance

An obvious means to usefully extend this research is to primarily research scanning beyond the perspective of the individual manager and to adopt an organisational perspective. As this research suggests that scanning is a highly individualised behaviour, an “organisational” perspective may translate to better understanding the interactions among managers in terms of scanning, and the connection between collective scanning behaviour and organisational decision making. Extending this research to investigate the connection between “organisational” scanning and decision making would position scanning research one further step toward organisational performance.

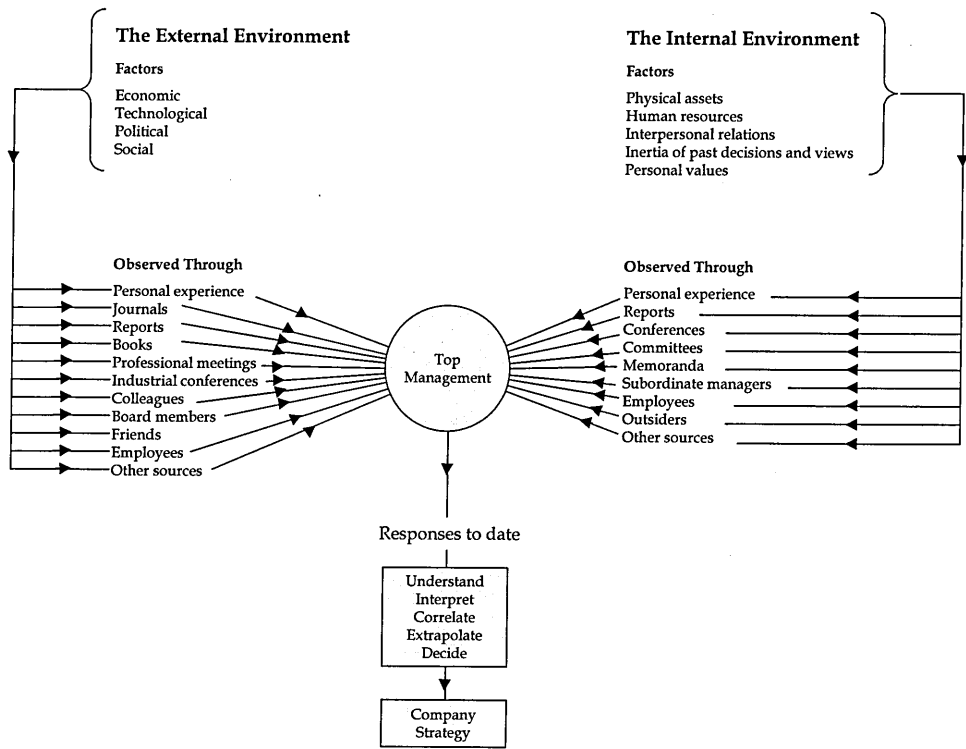
Future research possibilities include utilising the new elaborated scanning model developed in this research to assist in profiling the scanning behaviour of managers within the organisation. Different configurations of profiles of scanning behaviour, in the context of different strategy processes, could then be analysed against organisational firm performance.

Overall, the findings of this research suggest that a change in research orientation concerning scanning is required in order to avoid reporting inconclusive results as per prior studies. Analysing for the influence of personality characteristics and learning styles on scanning behaviour, and researching the link between scanning and strategy process and decision making represents a rich vein of future research activity helpful to making more substantive claims on how to effectively scan business environments.

APPENDICES:

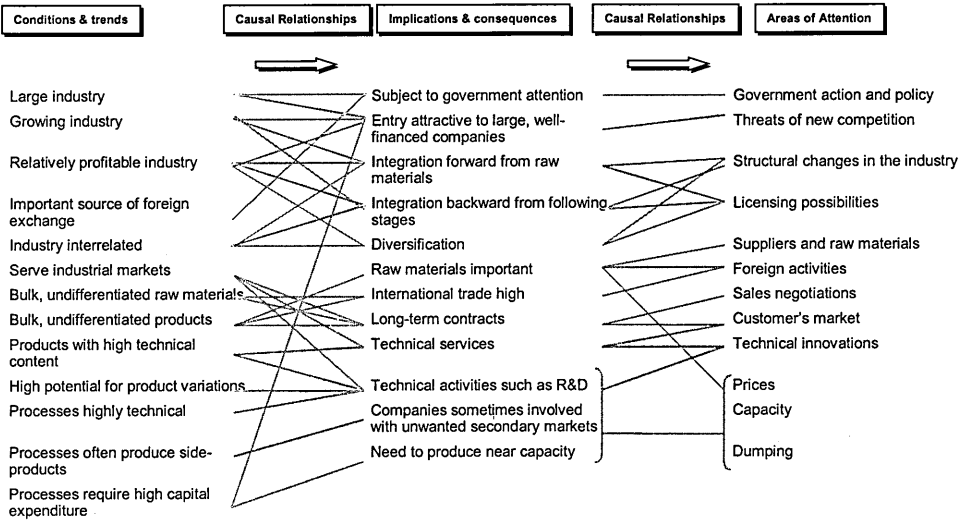
- A. Some of the many sources for strategic information.
- B. Relationship of industry conditions to areas of scanning attention.
- C. Categories of external information.
- D. Classification of external information sources.
- E. Description of environmental sectors – Duncan (1972)
- F. Description of environmental sectors – Waller, Huber, & Glick (1995)
- G. Environmental measurements: Limitations of approaches
- H. Summary of linear strategy, adaptive strategy, and interpretative strategy.
- I. Table summarising the key features of 13 major research studies relevant to scanning and interpretation.
- J. Industry classification of survey responses.
- K. Scanning modes: Non-MBA adoption statistics and simple chi-square test results.
- L. Strategy process and scanning mode chi-square test results.
- M. Scanning behaviour survey.
- N. Correlations among scanning behaviour elements.
- O. Summary of multiple regression results.
- P. References.

Appendix A. Some of the many sources for strategic information.



Source: Aguilar, F.J. "Scanning the Business Environment", MacMillan, New York, 1967

Appendix B. Relationship of industry conditions to areas of scanning attention.



Source: Aguilar, F.J. "Scanning the Business Environment", Macmillan, New York, 1967

Appendix C. Categories of external information.

	Category	General Content
1.	Market potential	Supply and demand considerations for market areas of current or potential interest: e.g. capacity, consumption, imports, exports.
2.	Structural change	Mergers, acquisitions, and joint ventures involving competitors; new entries into the industry.
3.	Competitors and industry	General information about a competitor, industry policy, concerted actions in the industry, and so forth.
4.	Pricing	Effective and proposed prices for products of current and potential interest.
5.	Sales negotiations	Information relating to a specific current or potential sale or contract for the firm.
6.	Customers	General information about current or near-potential customers, their markets, their problems.
7.	Leads for mergers, joint ventures, or acquisitions	Information concerning possibilities for the manager's own company.
8.	Suppliers and raw materials	Purchasing considerations for products of current or potential interest.
9.	New products, processes, and technology	Technical information relatively new and unknown to the company.
10.	Product problems	Problems involving existing products.
11.	Costs	Costs for processing, operations, and so forth for current and potential competitors, suppliers and customers, and for proposed company activities.
12.	Licensing and patents	Products and processes.
13.	General conditions	Events of a general nature: political, demographic, national, and so forth.
14.	Government actions and policies	Governmental decisions affecting the industry.
15.	Resources available	Persons, land, and other resources possibly available for the company.
16.	Miscellaneous	Items not elsewhere classified.

Area of External Information	General Content	Categories Included
Market tidings	Current activities in the market and the competitive field.	1 through 6
Technical tidings	Technology.	9 through 12
Broad issues	Events occurring outside the industrial environment.	13 and 14
Acquisition leads	Leads for acquisitions, joint ventures, and mergers.	7
Other tidings	Miscellaneous	8, 15 and 16

Source: Aguilar, F.J. "Scanning the Business Environment", MacMillan, New York, 1967

Appendix D. Classification of external information sources.

Column 1	Column 2	Column 3
Outside sources	Personal Sources	- Outside members - Customers - Suppliers - Others (e.g. bankers, consultants, persons in associated companies such as a licensee) - Non members - Outside business and professional associates - Others (e.g. chance encounters, neighbours)
	Impersonal sources	- Publications - Trade publications - Newspapers - All other impersonal sources (e.g. technical conference, trade show, exhibition, scheduled report from a consultant visual or other direct perception of an event or condition)
Inside sources	Personal sources	- Subordinates ("line" or "dotted" relationship) - Peers - Superiors ("line" or "dotted" relationship) - Others ("diagonal" relationship)
	Impersonal sources	- Regular and general reports and notices (e.g. salesman's call report, R&D department's monthly progress report) - Scheduled meetings

Source: Aguilar, F.J. "Scanning the Business Environment", MacMillan, New York, 1967

Appendix E. Description of environmental sectors – Duncan (1972)

Factors and components comprising the organisational's internal and external environment

Internal Environment

1. Organisational personnel component
 - A) Educational and technological background and skills
 - B) Previous technological and managerial skill
 - C) Individual member's involvement and commitment to attaining system's goals
 - D) Interpersonal behaviour styles
 - E) Availability of manpower for utilisation within the system
2. Organisational functional and staff units component
 - A) Technological characteristics of organisational units
 - B) Interdependence of organisational units in carrying out their objectives
 - C) Intra-unit conflict among organisational functional and staff units
 - D) Inter-unit conflict among organisational functional and staff units
3. Organisational level component
 - A) Organisational objectives and goals
 - B) Integrative process integrating individuals and groups into contributing maximally to attaining organisational goals
 - C) Nature of the organisation's product service

Source: Duncan, R.B. (1972) "Characteristics of Organizational Environments and Perceived Environmental Uncertainty", *Administrative Science Quarterly*, Vol. 20, 613-629

Factors and components comprising the organisational's internal and external environment

External Environment

4. Customer component
 - A) Distributors of product or service
 - B) Actual users of product or service
5. Suppliers component
 - A) New materials suppliers
 - B) Equipment suppliers
 - C) Product parts suppliers
 - D) Labour supply
6. Competitor component
 - A) Competitors for suppliers
 - B) Competitors for customers
7. Socio-political component
 - A) Government regulatory control over the industry
 - B) Public political attitude towards industry and its particular product
 - C) Relationship with trade unions with jurisdiction in the organisation
8. Technological component
 - A) Meeting new technological requirements of own industry and related industries in production of product or service
 - B) Improving and developing new products by implementing new technological advances in the industry

Source: Duncan, R.B. (1972) "Characteristics of Organizational Environments and Perceived Environmental Uncertainty", *Administrative Science Quarterly*, Vol. 20, 613-629

Appendix F. Description of environmental sectors – Waller, Huber, & Glick (1995).

Environmental sector heading:	Sector description:
1) Parent, division, or subsidiary	A parent is an organisation whose authority to direct change in the focal organisation follows from its legal ownership of the focal organisation. The division or subsidiary within the parent organisation allows for intra-company charges not directly related to the organisational element under study.
2) Regulatory	A regulator is an organisation whose authority to direct change in the focal organisation is explicit in public law. For purposes of the research, any governmental body (other than a parent body) should be coded as a regulator. This can also include the press or community group where positive or negative pressure can be exerted on the organisation.
3) Customer/client	A customer/client is an entity for which the focal organisation supplies products. The relationship between a customer/client and the focal organisation is usually contractual, but may be mandated by the focal organisation's parent or a regulator.
4) Competitor	A competitor is an organisation that acquires or attempts to acquire scarce resources from some specific entities (e.g. customers, parents) as does the focal organisation by providing, in exchange, the same products that the focal organisation uses in its exchanges with these specific entities.
5) Financial	This environment is manifested by funding entities from which the focal organisation obtains cash or its equivalent in return for equity in the focal organisation or promises or repayment. Examples of funding entities are lending institutions, venture capitalists, other organisations, and the capital markets.
6) Supplier	A supplier is an entity that provides products to the focal organisation. (In this context, cash or its equivalent, employees, or authorisations are not considered as products.) The relationship between the supplier and the focal organisation is usually contractual, but may be mandated by the supplier's parent organisation or a regulator.
7) Economic	The state of the economy is the rate at which goods and services are being exchanged. Since exchanges are made for the benefit of the parties involved, the state of the economy is also the rate at which the entities in the focal organisation's environment are acquiring benefits through the exchange of goods and services.
8) Labour market	A labour market is the pool of people that is potentially useful and potentially available to the focal organisation.
9) Union	A union is the organisation that contractually speaks for a portion of the focal organisation's employees.
10) Technology	A technology is a means by which goods can be made or services can be delivered and that are potentially useful and potentially available to the focal organisation. (Changes in technologies that affect the focal organisation through their impact on suppliers, customers/clients, or competitors should be coded in these respective sections.)

Source: Waller, M.J., Huber, G.P., & Glick, W.H. (1995) "Functional background as a determinant of executives' selective perception", Academy of Management Journal, Vol. 38, No. 4, 943-974

Appendix G. Environmental measurements: Limitations of approaches.

Limitation/Problem	Description	Implications
Archival Measures Data Aggregation	Aggregation of data from several firms to construct industry-level indices	Generalisability and accuracy of findings affected because: An industry may contain heterogeneous groups of firms.
Recency	All data points in a time series are weighted equally.	Privately held firms may not be included. Organisational members are likely to pay attention of events in the immediate past rather than events of a decade ago.
Correspondence	Lack of correspondence between a theoretical construct and its measurement.	Incorrect conclusions about relationships among constructs may lead to spurious results and interpretations.
Perceptual Measures Generalisability	Generalising a finding to a broader population (descriptive generalisation) or using variables in a study to generalise about a broader concept (theoretical generalisation).	Findings from a single study are situation specific and limited by the variables used in measurement of key constructs.
Reliability and validity	Researchers often use scales lacking in reliability and validity.	Leads to erroneous empirical results and subsequent misleading interpretations.
Source of Variation	Most instruments weight different environmental segments equally in deriving environmental measures.	Importance of environmental segments varies across industries and even within an industry over time.
Archival and Perceptual Measures Inconsistent Labels	Either same environmental dimension or attribute labeled differently in different studies or Different environmental dimensions often described with the same label.	Makes comparability among studies and cumulative building of theory difficult.

Possible relationships between objective and perceived environments

		Perceived Environment	
		Certain	Uncertain
Objective Environment	Certain	(1) A placid, randomised environment. firm recognises stable environmental conditions and plans accordingly.	(2) Firm misperceives the environment. Develops unnecessary resources to monitor environment and develop strategy. Type 1 ERROR
	Uncertain	(3) Firm misperceives the environment. Firm survival is threatened by competitive, technological and regulatory change. Type II ERROR	(4) Firm recognises uncertainty and develops appropriate information and planning capabilities.

Source: Boyd, B.K., Dess, G.G., & Rasheed, A.M.A. (1993) "Divergence between archival and perceptual measures of the environment: Causes and consequences. *Academy of Management Review*. 18: 204-226

Appendix H. Summary of linear strategy, adaptive strategy, and interpretative strategy.

Variable	Linear Strategy
Sample definition	"... determination of the basic long-term <i>goals</i> of an enterprise, and the adoption of courses of <i>action</i> and the allocation of <i>resources</i> necessary for carrying out these <i>goals</i> " (Chandler, 1962, p. 13, italics added)
Nature of strategy	Decisions, actions, plans Integrated
Focus for strategy	Means, ends
Aim of strategy	Goal achievement
Strategic behaviours	Change markets, products
Associated terms	Strategic planning, strategy formulation and implementation
Associated measures	Formal planning, new products, configuration of products or businesses, market segmentation and focus, market share, merger/acquisition, product diversity
Associated authors*	Chandler, 1962 Cannon, 1968 Learned, Christensen, Andrews, & Guth, 1969 Gilmore, 1970 Andrews, 1971 Child, 1972 Drucker, 1974 Paine & Naumes, 1974 Glueck, 1976 Lorange & Vancil, 1976 Steiner & Miner, 1977

* Classified by their definitions of strategy. Classification is not intended to imply that authors omit discussion of topics relevant to other models.

Variable	Adaptive Strategy
Sample definition	"... concerned with the development of a viable match between the opportunities and risks present in the external environment and the organisation's capabilities and resources for exploiting those opportunities" (Hofer, 1973, p.3).
Nature of strategy	Achieving a "match" Multifaceted
Focus for strategy	Means
Aim of strategy	Coalignment with the environment
Strategic behaviours	Change style, marketing, quality
Associated terms	Strategic management, strategic choice, strategic predisposition, strategic design, strategic fit, strategic thrust, niche
Associated measures	Price, distribution policy, marketing expenditure and intensity, product differentiation, authority changes, proactiveness, risk taking, multiplexity, integration, futurity, adaptiveness, uniqueness
Associated authors*	Hofer, 1973 Guth, 1976 Hofer & Schendel, 1978 Litschert & Bonham, 1978 Miles, Snow, Meyer & Coleman, 1978 Miller & Friesen, 1978 Mintzberg, 1978 Dill, 1979 Steiner, 1979 Rumelt, 1979 Hambrick, 1980 Bourgeois, 1980 Snow & Hambrick, 1980 Quinn, 1980 Jemison, 1981 Kotler & Murphy, 1981 Green & Jones, 1981 Hayman, 1981 Jauch & Osborn, 1981 Gluck et al., 1982 Chakravarthy, 1982 Hatten, 1982 Shirley, 1982 Camillus, 1982 Miles & Cameron, 1982 Galbraith & Schendel, 1983

** Classified by their definitions of strategy. Classification is not intended to imply that authors omit discussion of topics relevant to other models.*

Variable	Interpretative Strategy
Sample definition	Orienteering metaphors constructed for the purpose of conceptualising and guiding individual attitudes of organisational participants
Nature of strategy	Metaphor Interpretative
Focus for strategy	Participants and potential participants in the organisation
Aim of strategy	Legitimacy
Strategic behaviours	Develop symbols, improve interactions and relationships
Associated terms	Strategic norms
Associated measures	Measures must be derived from context, may require qualitative assessment
Associated authors*	Pettigrew, 1977 Van Cauwenbergh & Cool, 1982 Dirsmith & Covaleski, 1983 Chaffee, 1984

** Classified by their definitions of strategy. Classification is not intended to imply that authors omit discussion of topics relevant to other models.*

Source: Chaffee, E.E. (1985) "Three Models of Strategy", Academy of Management Review, 10, 1, 89-98

Appendix I. Table summarising the key features of 13 major research studies relevant to scanning and interpretation.

1. Aguilar, 1967
2. Kefalas & Schoderbek, 1973
3. Keegan, 1974
4. Hambrick, 1982
5. Daft, Sormunen, & Parks (1988)
6. Thomas, Clark, & Cioia (1993)
7. Gioia & Cittipediti (1991)
8. Daft & Weick (1984)
9. Milliken (1990)
10. Meyer (1982)
11. Daft & Macintosh (1981)
12. Isabelle (1990)
13. Scheid-Cook (1992)

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Aguilar (1967)	Scanning the business environment.	This study is concerned with the way in which top management gains relevant information about events occurring outside the company in order to guide the company's future course of action. The study primarily describes the "what", "where", and "how" of this process.	41 companies split as follows: 25 chemical manufacturing companies, 1 pharmaceutical company, 8 service companies dealing with the chemical industry to varying degrees, and one company from each of the 7 following industries: paper, oil, copper and wire, electronics, stainless steel, industrial refractory materials, and heating equipment. - Companies were based in the US and six Western European countries. 137 managers were involved. - Principal means of research was interview, supplemented by examination of relevant company documents. - Field research extended over 9 months.	The data in this study support the following key concepts and findings: - A scanning process may be thought of as a continuum along which four modes of scanning – undirected viewing, conditioned viewing, informal search, and formal search – are established. - The choice of modes may be influenced by four sets of rules: issue related rules, information related rules, capacity related rules, and change rules. - Regarding "what external information do managers obtain": market tidings outstripped other areas of information in importance; in general there was a connection between the manager's area of speciality and the subject matter of the external data he collected and regarded as important; there were few differences across managers at different hierarchical levels and the external information they obtained; managers in large companies were less concerned with short range marketing and technical tidings and more concerned with broad issues, acquisition leads, and other tidings than managers in medium sized companies. - Regarding "where do managers obtain external information": managers tend to rely almost as much on inside sources as on outside sources for important external information; personal sources far exceed impersonal sources in importance; there is a connection between manager's area of speciality and choice of outside source of information; technical managers place relatively low reliance on subordinates for external information, compared to marketing managers and general managers; first level managers showed a relatively high preference for source information from non-members whereas second level managers showed a relatively strong reliance on customers; the higher the level of responsibility, the less frequently a manager gains important external information from publications compared to other sources;

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
				managers of large companies tend to rely more heavily on inside sources than did managers of small companies; managers in small companies relied more on customers and suppliers as did their outside sources of external information than did managers in larger companies; experienced managers favour internal sources far more than inexperienced managers; inexperienced managers place greater reliance on publications compared to experienced managers; and inexperienced managers tend to rely more
				on outside member than on non-members, whereas experienced managers report the opposite. Regarding "how do managers obtain external information": managers appeared to solicit slightly less than half of all the important external information they received; solicited information is especially important when sourcing from personal sources; most organisationally solicited information comes from inside sources; directed, unsolicited information benefiting the source would be more likely to come from outside sources; for outside sources, the larger the company, the larger the proportion of information that enters on a solicited basis – especially on an expressly solicited basis; for inside sources, the smaller the firm, the more its managers seem to rely on information that is solicited – that is, organisationally solicited; and half the information that inexperienced managers received from outside sources was unsolicited and was communicated primarily for the benefit of the source which is in sharp contrast to those for experienced managers.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Kefalas and Schoderbek (1973)	Scanning the business environment – some empirical results.	Organisations are in constant interaction with their environment. This phenomenon has been termed in the literature as the environmental-organisational interface. An organisation acquires information concerning changes in its environment via some scanning system. This paper presents the results of an empirical investigation of the scanning process. The relationships of scanning to different environmental states are discussed and various propositions advanced. Different environmental states (stable versus dynamic) are moderated by the determinants of hierarchical levels and functional specialties in the firm.	- Two industries – Farm equipment and Meatpacking. - Classified Farm equipment industry as dynamic, and Meatpacking as stable, based on secondary sources and executive interviews. - Administer a scanning questionnaire to 40 executives in six companies (three in each industry). - Determinants analysed for were external environment (dynamic or stable), executive's hierarchical level, and executive's functional speciality.	- Kefalas and Schoderbek judged that the data supported the following four propositions – 1) managers working for an organisation in a dynamic environment will spend a higher percentage of their normal working day for acquisition of external information than managers working for an organisation in a stable environment, 2) all managers in both environments will spend more time acquiring information about the relatively controllable sectors of the external environment than for the relatively uncontrollable sectors, 3) generally, executives at lower managerial levels are expected to spend less time in acquiring external information than executives in higher levels, 4) It is expected that there will be relationship between the manager's functional area of speciality and his scanning style, i.e. executives will acquire more information relevant to their functional area (jobs). A possible exception to this rule is the market sector of marketing information. - This information sector is expected to dominate almost all executive scanning styles regardless of functional area. They judged that the data did not support the following 2 propositions: 1) Executives at higher organisational levels are expected to utilise more human sources of external information than executives in lower levels. This relationship is expected to be equally true for both industries, and 2) it is expected that "human" sources will be most important and will be utilised more frequently than either "documentary" or "combination" sources. This is expected to be truer for the dynamic environment industry than for the stable.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Keegan (1974)	Multinational scanning: A study of the information sources utilised by headquarters executives in multinational companies.	This article presents the findings of an empirical study of the scanning of the external environment by executives responsible for international operations in a sample of multinational corporations headquartered in the United States. The findings of the study reveal the great importance of human sources of information and sources outside the organisation. They also reveal how little executives rely upon systematic scanning methods. Computer based information systems were not detected in the study and even organised and managed manual systems were hardly significant as factors in day to day information gathering	- Data collected via semi-structured interviews. Retrospective event history of four instances over the last six months. Respondents described 1) the source of the information, 2) why they received the information, 3) how they received the information, and 4) to whom they passed the information. - Information needed to involve external information related in whole or part to international operations. - Interviewed 50 executives located at headquarters of 13 U.S. international corporations (9 corporations were in the food industry, 4 were in manufacturing).	The findings suggest that 1) executives in large business organisations rely much more on external sources for information about their business environment than is commonly believed, 2) how little the systemic methods of information scanning have become a part of the way in which executives learn about their business environment (computer based systems were not found in this study and even traditional manual systems of information retrieval were hardly significant as factors in day-to-day information gathering), 3) the importance of organisational boundaries on intracompany information flows. Divisional boundaries, functional specialisation, and level are significant barriers to the flow of information, therefore these are important in designing the organisation, 4) overall, respondents acquired external information mainly from sources outside their own companies. However, abroad they relied mainly upon sources inside their companies.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Hambrick (1982)	Environmental scanning and organisational strategy.	The purpose of this study was to test empirically the relationships between the environmental scanning activities of upper-level executives and their organisation's strategies, on the premise that executives would scan to reinforce their organisation's particular basis for competing. Among the three industries studied, there were differences in the strategy-scanning link. These differences may have been attributable to different dominant environmental requirements existing in each industry.	• Three industries – private liberal arts colleges, voluntary general hospitals, and life insurance firms. • Chief executive send questionnaire to 165 senior level executives (96% response rate). • Interviews in 6 organisations. • Miles and Snow (1978) strategy typology used.	• In this study, Hambrick concluded that upper-level executives did not indicate a consistent, concentrated tendency to scan according to their organisations' strategies. He suggests that this may be due to a general tendency among executives to scan according to their own personal or functional interests, lack of awareness of the organisation's strategy, or differences in how the researcher and the executive conceived of strategy.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Daft, Sormunen, and Parks (1988)	Chief executive scanning, environmental characteristics, and company performance: An empirical study.	Chief executives in 50 manufacturing companies were interviewed about the perceived strategic uncertainty in six environmental sectors, and the frequency and mode of scanning used for each sector. The findings suggest that customer, economic and competitor sectors generated greater strategic uncertainty than technological, regulatory and socio-cultural sectors. When sector uncertainty was high, executives reported greater frequency of scanning and greater use of personal information sources. Chief executives in high-performing companies scanned more frequently and more broadly in response to strategic uncertainty than their counterparts in low-performing companies.	50 medium sized, single business manufacturing companies. - interviews were used to administer questionnaires measuring change in environmental sectors, scanning sources used, and scanning frequency.	Three major interpretations were drawn: 1) sectors differed widely in the amount of strategic uncertainty created for chief executives, and customer, economic and competition sectors had greater strategic uncertainty than technological, regulatory and socio-cultural sectors, 2) chief executives responded to perceived strategic uncertainty across sectors with greater scanning frequency in all modes, and somewhat greater use of personal compared to written modes, and 3) chief executive scanning in higher-performing firms was characterised by more frequent scanning and by careful tailoring of scanning to perceived strategic uncertainty compared to chief executives in lower-performing firms.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Thomas, Clark, and Gioia (1993)	Strategic sensemaking and organisational performance: Linkages among scanning, interpretation, action, and outcomes.	This study investigated the strategic “sensemaking” processes of scanning, interpretation, and action and how these activities are linked to organisational performance. Using path analyses on data from 156 hospitals, this study tested the direct and indirect effects a month these sensemaking processes and performance outcomes and developed a model of their relationships. In a more general sense, the research represents an attempt to provide insight not only into relationships between cognition and action, but also into the links between those fundamental processes and organisational performance outcomes.	- Single industry focus to control for the impact of industry characteristics on the perceptions of strategic issues. Industry studies were healthcare. 545 questionnaires sent to hospital chief executives in Texas in 1987 (response rate 38%) across 156 hospitals. - Used a case-scenario methodology to study scanning and interpretation processes (constructed via secondary research and expert panel validated).	Overall, the main contribution of this study is its specification of links between the cognitive tasks of scanning and interpreting and organisational actions and performance. More generally, the study established an empirical basis for exploring and understanding linkages among cognition, action, and outcomes and provided some insight into sensemaking processes that contribute to variations in organisational performance.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Gioia and Chittipeddi (1991)	Sensemaking and Sensegiving in Strategic Change Initiation	This paper reports an ethnographic study of the initiation of a strategic change effort in a large, public university. It develops a new framework for understanding the distinctive character of the beginning stage of strategic change by tracking the first year of the change through four phases (labeled as envisioning, signaling, re-visioning, and energising). This interpretative approach suggests that the CEO's primary role in instigating the strategic change process might be best understood in terms of the emergent concepts of "sensemaking" and "sensegiving". Relationships between these central concepts and other important theoretical domains are then drawn and implications for understanding strategic change initiation are discussed.	- An "insider" and an "outsider" researcher were used. The inside researcher was a bonafide participant in the strategic change process who conducted the ethnography. The outside researcher conducted a more objective analysis of the data. - The research was conducted in a large, public, multiple-campus university over a 2.5 year period. - The strategic change effort studied was to make the university a "Top 10" public university.	- The first-order findings indicate that the initiation of the change evolved through four phases, which were labelled as Envisioning, Signalling, Re-Visioning, and Energising. These phases were found in the second-order analysis to correspond to the progressive iterations of sensemaking and sensegiving processes. The sensemaking/sensegiving cycles also were noted to correspond to cycles characterised by instances or periods of understanding and influence, or alternatively, as cycles typified by cognition and action, respectively. - Taken as a whole, the findings of the interpretative perspective and ethnographic approach to the study of strategic change imply that the initiation of the process involves a set of top management activities that are key to the effectiveness of the overall change process.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Daft and Weick (1984)	"Toward a Model of Organisations as Interpretation Systems"	A comparative model of organisations as interpretation systems is proposed. The model describes four interpretation modes: enacting, discovering, undirected viewing, and conditioned viewing. Each mode is determined by 1) management's beliefs about the environment and 2) organisational intrusiveness. Interpretation modes are hypothesised to be associated with organisational differences in environmental scanning, equivocally reduction, strategy, and decision making.	Theoretical paper.	This paper proposes a model or Organisations as Interpretation systems that is attempts to be both general and simple at the expense of precision and accuracy. The paper acknowledges that an interpretation system is an awesomely complex human social activity that may not be amenable to precise measurement at this point in development and that the ideas in this paper suggest a new viewpoint from which to interpret the richness and complexity of organisational activity.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Milliken (1990)	Perceiving and interpreting environmental change: an examination of college administrators' interpretation of changing demographics	This research examined the effect of organisational and resource dependence factors on college and university administrators' interpretation of an objectively verifiable environmental change: the decline in the number of 18-22 year olds in the United States. Results indicated that these characteristics significantly affected the interpretation of changing demographics but explained relatively little variance in administrators' certainty about how to respond to a change in environment. The research suggests that examining the interpretation of specific environmental changes may be a useful way of gaining insight into the factors that influence the environmental interpretation process.	- Statistics showing the decline in birth-rates in the U.S during the late 1960's and throughout the 1970's resulting in the shrinking supply of 18-22 year olds since 1983 were sourced the National Centre for Educational Statistics, 1982. - Sample of random 148 private, four-year, liberal arts colleges. - Questionnaires sent to 589 top-level administrators. 211 usable questionnaires were returned, representing 122 colleges and universities.	- In general, the pattern of results suggests that there are meaningful distinctions between the three types of uncertainty – state, effect, and response. - Although state certainty and effect certainty were positively correlated, state certainty explained less than 9% of the variance in effect certainty. - No relationship emerged between state certainty and response certainty, suggesting that merely perceiving the existence of an environmental change does not help to clarify strategic options for responding to the change. - The significant relationship between effect certainty and response certainty suggests that the more certain managers are that they are facing a significant threat, the less sure they are of their ability to respond effectively. - As hypothesised, resource dependence factors appear to affect how environmental changes will be interpreted, not whether they are noticed or whether managers will know how to respond - Administrators who perceived their institutions as effective and as having a strong institutional identity tended to be less convinced that the changing demographics would affect their institution and more certain that the institution would be able to respond effectively. - Contrary to the study's predictions, decentralisation was not related to perceived effect certainty or to response certainty.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Meyer (1982)	Adapting to environmental jolts.	This paper examines organisations to an environmental jolt – a sudden and unprecedented event (in this case, a doctors' strike) – that created a natural experiment within a group of hospitals. Although adaptations were diverse and appeared anomalous, they are elucidated by considering the hospitals' antecedent strategies, structures, ideologies, and stockpiles of slack resources. Assessments of the primacy of the antecedents suggest that ideological and strategic variables are better predictors of adaptations to jolts than are structural variables or measures of organisational slack.	- Voluntary hospitals in the vicinity of San Francisco, were "jolted" by an unprecedented strike by physicians in response to a major malpractice insurer abruptly terminating the group coverage of 4000 Northern California doctors and then offering to reinsure them at a 384% increase. - Research was conducted in 19 hospitals of intermediate sizes 100-400 beds. - A field study focusing on contingency relationships between hospitals' enacted environments, market strategies, formal structures, and informal processes was underway when the "jolt" occurred.	- The study proposes that whereas ideologies and strategies exert strong forces guiding organisations' adaptations, structures and slack resources impose weak constraints. - Qualitative analyses depicted adaptations as more consistent with social realities constructed through processes of ideological interpretation than with objective realities imposed by environmental events. - Quantitative analyses implied that ideological and strategic variables were better predictors of organisational perceptions, responses, and consequences than structural variables and measures of organisational slack.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
			New methods were devised for study the adaptations to the jolt. Three hospital with maximally disparate strategies, structures, and processes were identified using the baseline data, and their adaptations to the jolt were studied intensively through unstructured interviews and non-participant observation. Methods of obtaining qualitative data included telephone calls, prearranged interviews, and impromptu conversations in hospital corridors and waiting rooms. In addition, information was gleaned from financial records, occupancy figures, payroll data, chief administrators were interviewed after the strike to reconstruct sequences of events, and information elicited from other participants to verify administrators account.	

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Daft & Macintosh (1981)	A tentative exploration into the amount and equivocally of information processing in organisational work units	A model is proposed that relates the amount and equivocally of information processing to the variety and analysability of work-unit activities. New questionnaire scales were developed for the information and task variables, and an exploratory test of the model was conducted on 24 work units. The reported amount of information processing increased with both task variety and analysability; the reported use of equivocal information decreased with task analysability. The findings suggest a modification of the previously reported positive relationship between task uncertainty and amount of information processing.	• A questionnaire was developed. The seemed appropriate because the definition of information processing depends on the point of view of the information receiver. • Questionnaire was administered to 298 respondents in 24 work units. • 14 organisations participated, which included organisations from a variety of sectors – business, government, education, and service. • The sample also included a variety of work units from each organisation – e.g. trades, teaching, machine shop, legal, planning, accounting, etc. • Sample was limited to the Toronto-Ottawa-Montreal region Ontario and Quebec, Canada. • Questionnaires were distributed, or in a few cases, mailed to employees. • Of the 298 questionnaires issued, 253 were received and compiled.	• Within the limitations inherent in the research, the data imply a possible new perspective on information processing in organisations. • Task variety represents uncertainty about the occurrence of problems and exceptions. The finding for uncertainty about problem occurrence (variety) is entirely consistent with earlier theory and research. When uncertainty about problems was high, large amounts of information processing were reported. • Uncertainty about cause-effect processes (analysability), however, had the opposite relationship with information amount. Greater certainty was associated with smaller amounts of perceived information processing. One reason for this finding is that coding schemes are difficult to develop and information is difficult to share when activities are intangible and poorly understood. Participants may shift to an alternative mode of processing when information is “impacted” and cannot be easily shared among participants.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Isabella (1990)	Evolving interpretations as a change unfolds: How managers construe key organisational events	The purpose of this research was to develop a model of how managers construe organisational events as a change unfolds. The model, build from in-depth interviews with 40 managers, suggests that interpretations of key events unfold in four stages – anticipation, confirmation, culmination, and aftermath – link to the process of change. The construed reality and interpretative tasks at each stage as well as the triggers that impel managers to move from one stage to another are described. Implications for organisational research and the management of change are discussed.	- The research involved 40 managers from a medium-sized, urban, financial-services institution. - Each manager was asked to describe and discuss five events that had occurred in the organisation over the previous five years. - Participating managers represented four distinct organisational levels – 11 executives at the level of senior vice president and above, 10 managers at the level of vice president, 10 at the level of assistant vice president or director, and 9 at the level of manager. - Functional areas represented were finance, accounting, marketing, customer operations, data processing, legal services, and human resources.	- Desegregating task uncertainty into two dimensions thus revealed a possible new relationship between task uncertainty and information processing. More information processing was reported when there were many problems but also when processes were sufficiently analysable that information could be developed and shared among participants. - The results suggest a model for understanding how interpretations evolve as a change unfolds. The model attempts to capture how managers collectively construe events and concentrates on the identification and description of the frames of reference managers share during specific changes. - The model describes a sequence of four distinct stages – anticipation, confirmation, culmination, and aftermath – through which interpretations progress. - Each stage has a predominant frame of reference, interpretative task, and construed reality. - The implication of this progress is that the fullest understanding of an event may come from moving through all the interpretative stages.

Researcher:	Research title or abstract:	Summary:	Research design (key aspects):	Comments:
Scheid-Cook (1992)	Organisational Enactments and Conformity to Environmental Prescriptions	This paper argues that current conceptions of organisational activity as ritual conformity (or isomorphism) to institutional demands which exist in the environment must also incorporate an understanding of organisational enactment. Enactment entails a conception of the environment in terms of processes of reality construction; organisations are active in creating and defining institutional demands. Data is drawn from a study of the response of mental health organisations to outpatient commitment which is a legal policy designed to fulfill the societal demands for deinstitutionalisation of the mentally ill.	- Outpatient commitment (OPC) law defined in the North Carolina General Statutes to provide state-mandated support for the use of OPC by community mental health centres (CMHC's). - Research conducted in wards of state and community mental hospitals, courtrooms to observe civil commitment hearings, and into CMHC's to interview individuals placed on OPC and to talk about OPC with the professional staff of CMHCs. - Fieldnotes collected from 1984-86 and conversational interviews were the prime source of data, and documents relative to OPC were a second major source. - The Study originally included two-thirds of the state of North Carolina, covering a 60 county catchment area with one CMHC per county.	- The data in this paper points to variability of organisational response and contradicts the rational causal view of adaptation – i.e. organisations responded to institutional constraints according to rational decision-making processes whereby participants perceive an institutional demand or rational rule, will initiate a search form information on the costs and benefits of compliance, and will comply to the degree necessary in order to maintain organisational legitimacy. Instead, organisational participants enact rather than merely respond to their environments. - Organisations provide the context within which institutional purposes and rational myths are interpreted, and responses to contradictory demands will vary depending upon the organisation's inter-subjective definitions or available stock of knowledge. - Once having created the definitions of institutional rules, organisational participants justified their use (or non-use) of OPC in terms consistent with the institutional purposes they identified with OPC. - Individuals in positions with primary responsibility for OPC were able to impose their enactments on the organisation, but not in cases where the organisation had already enacted a view of OPC. - Constructions of meaning established through enactments are crucial to understanding organisational perceptions of environmental constraints and processes of legitimisation. As such, enactment provides a theoretical link between external constraints, symbolic actions with the organisation, and the substantive outcomes of the organisation.

Appendix J. Industry classification of survey responses.

Industry classification				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
agriculture	2	.5	.5	.5
mining and quarrying of energy producing materials	3	.8	.8	1.3
mining and quarrying except energy producing materials	1	.3	.3	1.5
manufacture of food products, beverages, and tobacco	11	2.8	2.8	4.3
manufacture of pulp, paper and paper products, publishing	9	2.3	2.3	6.6
manufacture of coke, petroleum products and nuclear fuel	10	2.5	2.6	9.2
manufacture of chemicals and chemical products	19	4.8	4.8	14.0
manufacture of other non-metallic mineral products	1	.3	.3	14.3
manufacture of basic metals and fabricated metal products	1	.3	.3	14.5
manufacture of other machinery and equipment	3	.8	.8	15.3
manufacture of electrical and optical equipment	15	3.8	3.8	19.1
manufacture of transport equipment	10	2.5	2.6	21.7
manufacture not elsewhere classified	3	.8	.8	22.4
electricity, gas, and water	5	1.3	1.3	23.7
construction	5	1.3	1.3	25.0
sale and maintenance of motor vehicles and motor cycles	2	.5	.5	25.5
wholesale trade and commission trade except motor vehicles	5	1.3	1.3	26.8
retail trade (except motor vehicles and motor cycles)	2	.5	.5	27.3
hotel and restaurants	2	.5	.5	27.8
land transport, transport via pipelines	3	.8	.8	28.6
air transport	5	1.3	1.3	29.8
supporting and auxiliary transport activities	4	1.0	1.0	30.9
post and telecommunications	20	5.1	5.1	36.0
monetary intermediation	35	8.9	8.9	44.9
activities auxiliary to financial intermediation	18	4.6	4.6	49.5
insurance and pension funding	21	5.3	5.4	54.8
other financial intermediation	15	3.8	3.8	58.7
business and consulting management activities	58	14.7	14.8	73.5
research and development	2	.5	.5	74.0
computer and related activities	27	6.9	6.9	80.9
miscellaneous business activities not elsewhere classified	1	.3	.3	81.1
real estate	1	.3	.3	81.4
engineering consultative and design activities	11	2.8	2.8	84.2
legal activities	7	1.8	1.8	86.0
other business activities	17	4.3	4.3	90.3
public administration and defence	15	3.8	3.8	94.1
education	5	1.3	1.3	95.4
health and social work	5	1.3	1.3	96.7
radio and television activities	7	1.8	1.8	98.5
other community, social and personal service activities	6	1.5	1.5	100.0
Total	392	99.5	100.0	
Missing	999	.5		
Total	394	100.0		

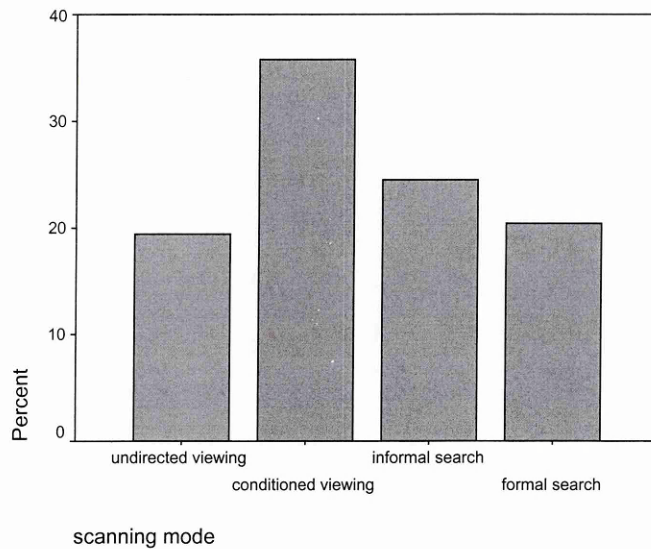
Appendix K. Scanning modes: Non-MBA adoption statistics and simple chi-square test results

Frequency statistics show that the lowest level of adoption was 19.4% for Undirected viewing, and that the highest level of adoption was 35.7% for Conditioned Viewing. For further information on the adoption of each scanning mode refer to the below Table titled, Non-MBA Scanning Mode adoption, and the below Figure titled, Percentage of Non-MBA Scanning Mode adoption.

Table: Non-MBA scanning mode adoption.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	undirected viewing	19	19.0	19.4	19.4
	conditioned viewing	35	35.0	35.7	55.1
	informal search	24	24.0	24.5	79.6
	formal search	20	20.0	20.4	100.0
	Total	98	98.0	100.0	
Missing	999	2	2.0		
Total		100	100.0		

Figure : Percentage of scanning mode adoption for Non-MBAs.



A simple chi-square test was run to test whether the observed pattern of events differed significantly from the expected pattern of equal observations per scanning mode. The chi-square test showed there was not a significant difference between the observed number and the expected number with respect to scanning mode adoption ($\chi^2 = 6.571$, $df = 3$, $p = 0.087$). Note that 0 cells (0%) had expected frequencies less than 5. The minimum expected cell frequency was 24.5. Hence, the null hypothesis that there are no significant differences among the adoption rate by Non-MBAs among the four scanning modes is not rejected.

The calculation of the residual values is as outlined in the below Table. A review of this table shows that the observations of conditioned viewing were slightly greater than expected, while the observations of all the other scanning modes were marginally lower than expected.

Table: Calculation of the residual from the chi-square test on Non-MBA scanning modes.

	Observed N	Expected N	Residual
undirected viewing	19	24.5	-5.5
conditioned viewing	35	24.5	10.5
informal search	24	24.5	-.5
formal search	20	24.5	-4.5
Total	98		

Based on a cursory review of the above residual table, it is reasonable to expect that the following differences between the scanning modes would be significant: undirected viewing would be significantly lower than conditioned viewing, and conditioned viewing would be significantly higher than formal search.

These expected differences were confirmed through a set of simple chi-square tests for each of the above combinations. The results of the tests for these combinations were as follows: for undirected viewing and conditioned viewing there was a significant difference between the observed number and the expected number ($\chi^2 = 4.741$, $df = 1$, $p = 0.029$), and for conditioned viewing and formal search there was a significant difference between the observed number and the expected number ($\chi^2 = 4.091$, $df = 1$, $p = 0.043$). Note that in all of these tests 0 cells (0%) had expected frequencies less than 5.

For the sake of completeness, a further set of chi-square tests were done on all the other possible comparisons of scanning modes for Non-MBA respondents. No other significant differences emerged.

Appendix L. Strategy process and scanning mode chi-square test results.

This appendix contains the cross tabulations and chi-square test results for those tests in which an overall non-significant relationship between strategy process and scanning mode emerged. These results are none-the-less of interest and are commented upon in Section 7.2.3, Strategy process and scanning mode.

Emergent strategy process and scanning mode

An analysis was performed to test for an association between emergent strategy processes and scanning modes. This involved a cross-tab analysis and chi-square test. For emergent strategy process, the appropriate cut off points to stratify respondents into three groups was determined to be 1, 2, and 3 for low scores, 4 for the medium scores, and 5, 6, and 7 for the high scores. The results of the cross-tabulation, for which there were 378 valid cases, is presented in the below Table. The particular relationship of interest in this test was whether managers who rated high on emergent strategy process would engage in significantly higher levels of conditioned viewing.

Table: Emergent strategy process and scanning mode chi-square test results.

			scanning mode				Total
			undirected viewing	conditioned viewing	informal search	formal search	
Strategy process emergent	1.00 Low	Count	27	37	36	38	138
		Expected Count	21.5	43.8	34.0	38.7	138.0
		% within Strategy process emergent	19.6%	26.8%	26.1%	27.5%	100.0%
		% within scanning mode	45.8%	30.8%	38.7%	35.8%	36.5%
		% of Total	7.1%	9.8%	9.5%	10.1%	36.5%
	2.00 Med	Count	9	26	9	17	61
		Expected Count	9.5	19.4	15.0	17.1	61.0
		% within Strategy process emergent	14.8%	42.6%	14.8%	27.9%	100.0%
		% within scanning mode	15.3%	21.7%	9.7%	16.0%	16.1%
		% of Total	2.4%	6.9%	2.4%	4.5%	16.1%
	3.00 High	Count	23	57	48	51	179
		Expected Count	27.9	56.8	44.0	50.2	179.0
		% within Strategy process emergent	12.8%	31.8%	26.8%	28.5%	100.0%
		% within scanning mode	39.0%	47.5%	51.6%	48.1%	47.4%
		% of Total	6.1%	15.1%	12.7%	13.5%	47.4%
	Total	Count	59	120	93	106	378
		Expected Count	59.0	120.0	93.0	106.0	378.0
		% within Strategy process emergent	15.6%	31.7%	24.6%	28.0%	100.0%
		% within scanning mode	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	15.6%	31.7%	24.6%	28.0%	100.0%

The chi-square test run on this data showed that there was not a significant relationship between perceived levels of adoption of emergent strategy process and the scanning mode adopted ($\chi^2 = 8.529$, $df = 6$, $p = 0.202$). The data shows that within emergent strategy process group 3 ("high scores") the percentage of conditioned viewing adoption at 31.8% was higher, as predicted, than the percentage of conditioned viewing adoption within emergent strategy process group 1 ("low score") at 26.8%. However, there was no evidence of an overall trend, as the percentage of conditioned viewing within emergent strategy process group 2 ("medium scores") was the highest at 42.6%. Overall the test result does not support rejecting the null hypothesis that there is no significant association between emergent strategy process and scanning modes.

Visionary strategy process and scanning mode

An exercise was also done to test for a relationship between visionary strategy process and scanning modes. A cross-tab analysis and chi-square test was therefore performed. The appropriate cut off points were determined to be 1 to 4 for the low scores, 5 for the medium scores, and 6 and 7 for the high scores. The results of the cross-tabulation, for which there were 379 valid cases, is presented in the below Table.

Table: Visionary strategy process and scanning mode cross-tabulation.

			scanning mode				Total
			undirected viewing	conditioned viewing	informal search	formal search	
Strategy process visionary	1.00 Low	Count	22	25	23	22	92
		Expected Count	14.3	29.1	22.6	26.0	92.0
		% within Strategy process visionary	23.9%	27.2%	25.0%	23.9%	100.0%
		% within scanning mode	37.3%	20.8%	24.7%	20.6%	24.3%
		% of Total	5.8%	6.6%	6.1%	5.8%	24.3%
	2.00 Med	Count	11	28	22	21	82
		Expected Count	12.8	26.0	20.1	23.2	82.0
		% within Strategy process visionary	13.4%	34.1%	26.8%	25.6%	100.0%
		% within scanning mode	18.6%	23.3%	23.7%	19.6%	21.6%
		% of Total	2.9%	7.4%	5.8%	5.5%	21.6%
	3.00 High	Count	26	67	48	64	205
		Expected Count	31.9	64.9	50.3	57.9	205.0
		% within Strategy process visionary	12.7%	32.7%	23.4%	31.2%	100.0%
		% within scanning mode	44.1%	55.8%	51.6%	59.8%	54.1%
		% of Total	6.9%	17.7%	12.7%	16.9%	54.1%
	Total	Count	59	120	93	107	379
		Expected Count	59.0	120.0	93.0	107.0	379.0
		% within Strategy process visionary	15.6%	31.7%	24.5%	28.2%	100.0%
		% within scanning mode	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	15.6%	31.7%	24.5%	28.2%	100.0%

The chi-square test run on this data showed that there was not a significant relationship between perceived levels of adoption of visionary strategy process and the scanning mode adopted ($\chi^2 = 8.013$, $df = 6$, $p = 0.237$).

Top-tier manager emergent strategy process and scanning mode

An analysis was performed to test for an association between top-tier manager emergent strategy process and scanning modes. This involved a cross-tab analysis and chi-square test. For emergent strategy process, the appropriate cut off points to stratify respondents into two groups was determined to be 1, 2, 3, and 4 for low scores, and 4, 5, 6, and 7 for the high scores. The results of the cross-tabulation, for which there were 108 valid cases, is presented in the below Table. The particular hypothesis of interest in this test was whether managers who rated high on emergent strategy process would engage in significantly higher levels of conditioned viewing.

Table: Top-tier manager emergent strategy process frequency statistics.

			scanning mode				Total
			undirected viewing	conditioned viewing	informal search	formal search	
Strategy top tier emergent	1.00 Low	Count	10	22	7	12	51
		Expected Count	9.9	20.3	9.9	10.9	51.0
		% within Strategy top tier emergent	19.6%	43.1%	13.7%	23.5%	100.0%
		% within scanning mode	47.6%	51.2%	33.3%	52.2%	47.2%
		% of Total	9.3%	20.4%	6.5%	11.1%	47.2%
	2.00 High	Count	11	21	14	11	57
		Expected Count	11.1	22.7	11.1	12.1	57.0
		% within Strategy top tier emergent	19.3%	36.8%	24.6%	19.3%	100.0%
		% within scanning mode	52.4%	48.8%	66.7%	47.8%	52.8%
		% of Total	10.2%	19.4%	13.0%	10.2%	52.8%
Total		Count	21	43	21	23	108
		Expected Count	21.0	43.0	21.0	23.0	108.0
		% within Strategy top tier emergent	19.4%	39.8%	19.4%	21.3%	100.0%
		% within scanning mode	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	19.4%	39.8%	19.4%	21.3%	100.0%

The chi-square test run on this data showed that there was not a significant association between perceived levels of adoption of emergent strategy process and the scanning mode adopted ($\chi^2 = 2.121$, $df = 3$, $p = 0.548$). Hence, these overall test results do not support rejecting the null hypothesis that there is no association between emergent strategy process and scanning modes for top-tier managers.

Top-tier visionary strategy process and scanning modes

A similar analysis was performed to test for an association between top-tier manager visionary strategy process and scanning modes for top-tier managers. Top-tier manager respondents were stratified into two groups: those that answered with relatively high scores versus low scores. The cut-off point to separate high scores and low scores on visionary strategy process was determined by reviewing the frequency statistics to identify the 50% percentile. The appropriate cut-off points to stratify top-tier respondents into two groups was determined to be 1, 2, 3, 4, and 5 for the low scores, and 6 and 7 for the high scores.

The results of the cross-tabulation, for which there were 108 valid cases, is presented in the below Table. The particular hypothesis of interest in this test was whether top-tier managers who rated high on visionary strategy process would engage in significantly higher levels of conditioned viewing.

Table: Top-tier manager visionary strategy process and scanning mode chi-square test results.

			scanning mode				Total
			undirected viewing	conditioned viewing	informal search	formal search	
Strategy top tier visionary	1.00 Low	Count	11	19	10	10	50
		Expected Count	9.7	19.9	9.7	10.6	50.0
		% within Strategy top tier visionary	22.0%	38.0%	20.0%	20.0%	100.0%
		% within scanning mode	52.4%	44.2%	47.6%	43.5%	46.3%
		% of Total	10.2%	17.6%	9.3%	9.3%	46.3%
	2.00 High	Count	10	24	11	13	58
		Expected Count	11.3	23.1	11.3	12.4	58.0
		% within Strategy top tier visionary	17.2%	41.4%	19.0%	22.4%	100.0%
		% within scanning mode	47.6%	55.8%	52.4%	56.5%	53.7%
		% of Total	9.3%	22.2%	10.2%	12.0%	53.7%
Total		Count	21	43	21	23	108
		Expected Count	21.0	43.0	21.0	23.0	108.0
		% within Strategy top tier visionary	19.4%	39.8%	19.4%	21.3%	100.0%
		% within scanning mode	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	19.4%	39.8%	19.4%	21.3%	100.0%

The chi-square test run on this data showed that there was not a significant relationship between perceived levels of adoption of visionary strategy process and the scanning mode adopted ($\chi^2 = 0.478$, $df = 3$, $p = 0.924$). The test result does not support rejecting the null hypothesis that there is no significant association between visionary strategy process and scanning modes.

Appendix M. Scanning behaviour survey.

Scanning Behaviour Survey

1

Personal details

Name

Title

Company

(If applicable) Company division
within which you work

Date of birth

2

Please click on which functional area you currently work in:

- ☐ Research & Development
- ☐ Marketing
- ☐ Sales
- ☐ Customer Service
- ☐ Production
- ☐ Financial Accounting
- ☐ Corporate Planning
- ☐ General Management
- ☐ Engineering
- ☐ Human Resources
- ☐ Information Technology
- ☐ Other (please write in)

3

INDUSTRY

What industry does your company mainly operate within?

4

Professional Details

How long have you been with your

company?
 How long within your current
 functional area?
 If you've worked in other functions,
 what were they?



5 SIZE OF COMPANY
 What is the approximate size of the company in which you work
 in terms of revenue?

- ☐ <£1m
- ☐ £1-10m
- ☐ £11-100m
- ☐ £101-500m
- ☐ £501-1b
- ☐ >£1b
- ☐ Don't know



6 What is the approximate size of the current company to which
 you belong in terms of:

Number of full- _____
 time employees _____



7 How many organisational levels are you below the chief executive
 or managing director of the company?



8 FREQUENCY
 Below you will find topics of information about the external
 environment. Please indicate how frequently each type of
 information comes to your attention using the one (1) to seven (7)
 scale below. A score of 1 means that this type of information
 comes to your attention very infrequently, for example, once
 every six months or less. A score of 4 may indicate a frequency of
 once every couple of months or so. A score of 7 indicates that
 this information comes to your attention very frequently, for
 example, once every day or more.

1	2	3	4	5	6	7
Very infrequently (for example, once every six months or less)						Very frequently (for example, once every day or more)

Macro level economic information

Trends within your company's industry

1	2	3	4	5	6	7
Functional specialist information						
1	2	3	4	5	6	7
Major business leader commentaries						
1	2	3	4	5	6	7
Emerging technologies with potential to impact business						
1	2	3	4	5	6	7
Management techniques						
1	2	3	4	5	6	7
Innovation in a competing product or service						
1	2	3	4	5	6	7
Customer companies						
1	2	3	4	5	6	7
Supplier companies						
1	2	3	4	5	6	7
Joint venture or alliance partners						
1	2	3	4	5	6	7
Information about your current company						
1	2	3	4	5	6	7
Information about your prior employer company(ies)						
1	2	3	4	5	6	7
Spending priorities of other companies						
1	2	3	4	5	6	7
Regulatory, governmental, and legislative information						
1	2	3	4	5	6	7
Competitor companies						
1	2	3	4	5	6	7

9

TIME

How do you divide your time finding out about topics of potential significance? Please allocate 100% across the following categories. You may find it useful to glance at all the categories first.

Competition(%)	
Customers(%)	
Technical information related to your products/ services(%)	
Supplier(%)	
Economic environment and regulatory(%)	
Broader social/ cultural issues(%)	

TIME

On average how many hours per week do you spend finding out

110

about all of the topics outlined in Q9?

111

SCANNING BEHAVIOUR

Please indicate the extent to which you agree with the following statements from one (1) "strongly disagree" to seven (7) "strongly agree".

1	2	3	4	5	6	7
Strongly disagree - almost never applies to me						Strongly agree - almost always applies to me
I usually seek out clearly identified types of information						
1	2	3	4	5	6	7
I am usually very clear on what type of information I am seeking and for what purpose						
1	2	3	4	5	6	7
I use many and varied sources of information						
1	2	3	4	5	6	7
I have a very fine grained screening criteria to discern which information I should pay further attention to						
1	2	3	4	5	6	7
I am typically able to individually assess the significance of certain information I am exposed to						
1	2	3	4	5	6	7
I think that effective scanning of the environment should be very broad (e.g. industry, general economic, political, and social level analysis) and adopt a medium to long term outlook						
1	2	3	4	5	6	7
I usually have a formal structured plan or process to gather the information I consider I need						
1	2	3	4	5	6	7
I would describe my approach to scanning for key information about the environment as very systematic						
1	2	3	4	5	6	7
I consider that information gained through my personal sources, versus public sources, to be the most valuable						
1	2	3	4	5	6	7
I consider information that is communicated informally, versus formally, to be the most valuable						
1	2	3	4	5	6	7
I consider that information needs to be received almost immediately for it to be valuable						
1	2	3	4	5	6	7
I consider information received verbally to be more valuable than in printed form						
1	2	3	4	5	6	7
I consider that dialogue, versus one-way-information, is critical to assessing the significance of information						

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I substantially change the type of information I pay attention to in different circumstances						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I substantially change the way I gather information according to different circumstances						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I have changed the way I gather information because of the internet						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I think information overload is a greater issue now than 2 years ago						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I could scan (i.e. gather relevant information in the business environment) more effectively						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I usually seek out information that is primarily relevant to strategic decisions as opposed to operational decisions						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I tend to scan broadly for information, mindful that any piece of information could bear on a strategic problem						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I usually seek out information that helps me to solve complex problems requiring innovative solutions, versus routine solutions that relate to recurrent problems						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I discern information that is strategic - useful for considering how to ensure competitiveness - from non-strategic information						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I often can not find all the strategic information that I want						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I often receive information that is not helpful to me						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I believe that individual scanning is more effective when organisations provide support resources (e.g. systems, etc.)						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I think that effective scanning - securing relevant information - is a largely individual and intuitive activity						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I think effective scanning of the environment should be focused on the local market and adopt a short-term to medium term outlook						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I think that scanning for relevant strategic information in the environment will always be an incomplete and imperfect process, for the environment is too extensive and complex to be completely analysable						
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
I think the capacity of an individual manager to absorb information via scanning falls far short of the volume of information available and is a limiting factor to effective scanning						

I spend much more of my time attuned to internal information concerning my organisation's level of effectiveness than to external information

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SCANNING BEHAVIOUR (CONT.)

Please indicate the extent to which you agree with each of the following statements on a one (1) "strongly disagree" to seven (7) "strongly agree".

1	2	3	4	5	6	7
Strong disagree - almost never applies to me						Strongly agree - almost always applies to me

I trust broadcast media information received directly from external sources more than I trust information from company personnel

I often feel uneasy because I can't deal with the massive amounts of information I come across

I don't think data or information by itself is important unless it is recognised as relevant to some particular purpose

I don't consciously scan for information unless I have a particular business purpose in mind

I tend to limit the information I'm exposed to when I feel overwhelmed

I think that it is important to scan broadly over time to be able to recognise important trends through the cumulative effect of processing many items of information

I scan not only for information relevant to my job and organisation, but also for my personal interests

I will usually change the information mediums I use when I feel overwhelmed by the amount of information I come across

I am not really able to assess the significance of new information on subjects that I'm not familiar with

I do not have much available time to scan for relevant external information given my job responsibilities

I am not expressly rewarded or penalised based on my scanning behaviour

I am motivated to learn all I can about events and trends in the environment that are strategically relevant to my organisation

1 2 3 4 5 6 7

I am very aware that the information I receive from outside the organisation may be distorted both unintentionally and deliberately

1 2 3 4 5 6 7

I have developed a routine whereby I focus on a few familiar sources that meet my information needs

1 2 3 4 5 6 7

18

Strategy Process

Please indicate to what extent the following statements reflect your perception of how strategic decisions are made in your organisation.

1 Strongly disagree 2 3 4 5 6 7 Strongly agree

The strategy we follow is directed by a vision of the future associated with the chief executive (or another senior figure)

1 2 3 4 5 6 7

We have well defined planning procedures to search for solutions to strategic problems

1 2 3 4 5 6 7

Our strategy develops through a process of ongoing adjustment

1 2 3 4 5 6 7

Our chief executive tends to impose strategic decisions rather than consulting the top management team

1 2 3 4 5 6 7

We have precise procedures for achieving strategic objectives

1 2 3 4 5 6 7

We tend to develop strategy by experimenting and trying new approaches in the market place

1 2 3 4 5 6 7

19

SOURCES

Please indicate how often you use the following sources of information to find out about events outside your organisation. For each source, please indicate frequency using the one (1) to seven (7) scale below. A score of 1 means that you use this source very infrequently, for example, once every six months or less. A score of 4 may indicate a frequency of once every couple of months or so. A score of 7 indicates that you use this source very frequently, for example, once every day or more.

1 Very infrequently (for example, once every six months or less) 2 3 4 5 6 7 Very frequently (for example, once every day or more)

Personal networks of individuals outside your company

1 2 3 4 5 6 7

Internet sources including search engines, company websites, email

information subscription services

1 2 3 4 5 6 7

Traditional mediums such as television, radio, newspaper, business magazines etc.

1 2 3 4 5 6 7

Company personnel such as superiors, peers, subordinates

1 2 3 4 5 6 7

PASSIVE RECEIPT OF INFORMATION

Each of the below statements in Q15 and Q16 indicates a situation in which you receive information about external topics that you did not actively seek out. You may have received this information as part of a formal reporting process or alternatively received the information casually. Please use the below one (1) through to seven (7) scale to indicate how frequently these situations occur. A score of 1 means that this occurs very infrequently, for example, once every six months or less. A score of 4 may indicate a frequency of once every couple of months or so. A score of 7 indicates this occurs very frequently, for example, once every day or more.

15

As part of a formal reporting process (e.g. receipt of market reports, competitor analysis, trend updates etc.), I receive information about external topics from:

1 Very infrequently (for example, once every six months)	2	3	4	5	6	7 Very frequently (for example, once every day or more)
--	---	---	---	---	---	---

My superiors

1 2 3 4 5 6 7

My peers

1 2 3 4 5 6 7

My subordinates

1 2 3 4 5 6 7

Company information reporting systems

1 2 3 4 5 6 7

External consultants

1 2 3 4 5 6 7

External market research professionals

1 2 3 4 5 6 7

External industry commentators

1 2 3 4 5 6 7

16

Informally or casually (e.g. corridor conversations, coffee room remarks, work breaks, social functions), I receive information about external topics from:

1 Very infrequently	2	3	4	5	6	7 Very frequently
---------------------------	---	---	---	---	---	-------------------------

(for
example,
once every
six months or
less)

(for
example,
once every
day or more)

My superiors

1 2 3 4 5 6 7

My peers

1 2 3 4 5 6 7

My subordinates

1 2 3 4 5 6 7

External consultants

1 2 3 4 5 6 7

External market research professionals

1 2 3 4 5 6 7

External industry commentators

1 2 3 4 5 6 7

17

SCANNING MODES

Please indicate which one of the following descriptions best reflects your more usual mode of information search and gathering.

- ☐ General exposure to information where I have no specific purpose in mind with the possible exception of exploration
- ☐ Directed exposure, not involving active search, to a more or less clearly identified area or type of information
- ☐ Relatively limited and unstructured effort to obtain specific information or information for a specific purpose
- ☐ Deliberate effort, usually following a pre-established plan, procedure or methodology, to secure specific information or information relating to a specific view

18

Please feel free to add any further comments on the above questions.

SUBMIT

Click the "Submit" arrow to send your answers and proceed to the next page in the survey.

Appendix N. Correlations among scanning behaviour elements.

		Correlations						
		SBSCALE1	SBSCALE2	SBSCALE3	SBSCALE4	ATTSC1	ATTSC2	ATTSC3
SBSCALE1	Pearson Correlation	1	.124*	-.087	.068	.246**	.200**	.204**
Formality	Sig. (2-tailed)	.	.021	.105	.210	.000	.000	.000
	N	356	348	348	345	353	335	354
SBSCALE2	Pearson Correlation	.124*	1	.180**	-.004	-.009	.112*	.034
Personal	Sig. (2-tailed)	.021	.	.001	.937	.860	.040	.528
	N	348	354	348	345	351	333	352
SBSCALE3	Pearson Correlation	-.087	.180**	1	.042	.063	-.040	.025
Incompleteness	Sig. (2-tailed)	.105	.001	.	.439	.241	.467	.635
	N	348	348	355	349	352	333	353
SBSCALE4	Pearson Correlation	.068	-.004	.042	1	.096	.129*	.074
Breadth	Sig. (2-tailed)	.210	.937	.439	.	.072	.019	.164
	N	345	345	349	352	349	331	350
ATTSC1	Pearson Correlation	.246**	-.009	.063	.096	1	.341**	.345**
Market	Sig. (2-tailed)	.000	.860	.241	.072	.	.000	.000
	N	353	351	352	349	360	341	358
ATTSC2	Pearson Correlation	.200**	.112*	-.040	.129*	.341**	1	.376**
Chain	Sig. (2-tailed)	.000	.040	.467	.019	.000	.	.000
	N	335	333	333	331	341	341	339
ATTSC3	Pearson Correlation	.204**	.034	.025	.074	.345**	.376**	1
Specialist	Sig. (2-tailed)	.000	.528	.635	.164	.000	.000	.
	N	354	352	353	350	358	339	361
Personal networks of individuals outside your company	Pearson Correlation	.182**	.256**	.055	.087	.080	.147**	.112*
	Sig. (2-tailed)	.001	.000	.304	.103	.131	.007	.036
	N	349	348	352	350	353	334	354
Internet sources including search engines, company websites, email	Pearson Correlation	.148**	.024	.149**	.065	.202**	.112*	.154**
	Sig. (2-tailed)	.006	.658	.005	.225	.000	.041	.004
	N	350	349	352	350	354	335	355
Traditional mediums such as television, radio, newspaper, business magazine etc	Pearson Correlation	.068	-.024	.038	.261**	.206**	.127*	.087
	Sig. (2-tailed)	.205	.659	.477	.000	.000	.020	.100
	N	350	349	352	350	354	335	355
Company personnel such as superiors, peers, subordinates	Pearson Correlation	.130*	.105	.008	.129*	.153**	.240**	.139**
	Sig. (2-tailed)	.015	.051	.888	.016	.004	.000	.009
	N	349	347	349	347	351	332	352
average time spent scanning per week	Pearson Correlation	.140**	.101	-.107*	.135*	.107*	.102	.056
	Sig. (2-tailed)	.008	.058	.044	.011	.042	.060	.291
	N	356	354	355	352	360	341	361

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Personal networks of individuals outside your company	Internet sources including search engines, company websites, email information subscription services	Traditional mediums such as television, radio, newspaper, business magazines etc.	Company personnel such as superiors, peers, subordinates	average time spent scanning per week
SBSCALE1 Formality	Pearson Correlation Sig. (2-tailed) N	.182** .001 349	.148** .006 350	.068 .205 350	.130* .015 349	.140** .008 356
SBSCALE2 Personal	Pearson Correlation Sig. (2-tailed) N	.256** .000 348	.024 .658 349	-.024 .659 349	.105 .051 347	.101 .058 354
SBSCALE3 Incompleteness	Pearson Correlation Sig. (2-tailed) N	.055 .304 352	.149** .005 352	.038 .477 352	.008 .888 349	-.107* .044 355
SBSCALE4 Breadth	Pearson Correlation Sig. (2-tailed) N	.087 .103 350	.065 .225 350	.261** .000 350	.129* .016 347	.135* .011 352
ATTSC1 Market	Pearson Correlation Sig. (2-tailed) N	.080 .131 353	.202** .000 354	.206** .000 354	.153** .004 351	.107* .042 360
ATTSC2 Chain	Pearson Correlation Sig. (2-tailed) N	.147** .007 334	.112* .041 335	.127* .020 335	.240** .000 332	.102 .060 341
ATTSC3 Specialist	Pearson Correlation Sig. (2-tailed) N	.112* .036 354	.154** .004 355	.087 .100 355	.139** .009 352	.056 .291 361
Personal networks of individuals outside your company	Pearson Correlation Sig. (2-tailed) N	1 .356	.026 .621 356	.066 .213 356	.119* .025 353	.125* .019 356
Internet sources including search engines, company websites, email information subscription services	Pearson Correlation Sig. (2-tailed) N	.026 .621 356	1 .357	.258** .000 357	.170** .001 354	-.058 .271 357
Traditional mediums such as television, radio, newspaper, business magazines etc.	Pearson Correlation Sig. (2-tailed) N	.066 .213 356	.258** .000 357	1 .357	.296** .000 354	.014 .794 357
Company personnel such as superiors, peers, subordinates	Pearson Correlation Sig. (2-tailed) N	.119* .025 353	.170** .001 354	.296** .000 354	1 .354	.125* .018 354
average time spent scanning per week	Pearson Correlation Sig. (2-tailed) N	.125* .019 356	-.058 .271 357	.014 .794 357	.125* .018 354	1 .363

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix O. Summary of multiple regression results.

Independent variables:	Dependent variables:												
	Scanning characteristics:				Scanning attention:				Scanning sources:				
	SB1	SB2	SB3	SB4	A1	A2	A3	A4	S1	S2	S3	S4	Time
Hierarchy	.095	-.014	.036	-.034	-.008	.005	-.002		-.134	.153*	.005	-.049	-.050
Funct. role: General	.520	-.342	.073	.171	.639	.088	-.018		.367	.224	.443	.118	.485
Funct. role: bus. develop	.541	-.207	.094	.063	.566	.121	.036		.330	.225	.342	.037	.570
Funct. role: Operations	.318	-.169	-.039	.032	.394	.124	.169		.371	.217	.205	-.035	.341
Funct. role: Support	.378	-.163	.082	.079	.348	.027	.074		.228	.164	.333	.006	.284
Age	.182 *	.071	.036	-.094	.017	.027	-.076		.063	.042	-.019	.096	.014
Cross functional experience	-.142 *	-.053	-.026	-.035	-.112*	-.023	-.070		-.041	.054	-.091	.003	-.020
Post graduate management education	.182 *	-.024	-.078	-.136	-.034	-.050	.063		-.004	-.075	.034	.073	-.127*
Company size	.012	.028	-.094	-.034	.032	-.112	-.086		.039	-.057	.089	.0174*	.076
Industry: Manufacture	.003	.005	.052	.106	.052	.004	.039		.018	-.007	-.013	-.117	.077
Industry: Trans comm.	.079	.008	-.027	-.031	.096	.008	.043		.037	.102	.003	-.019	-.044
Industry: Financial	-.018	.025	.021	.100	.233*	-.013	.023		.088	.044	.049	-.124	.149
Industry: Other	-.012	.114	.006	-.035	.003	.030	.099		.071	.173*	.015	-.058	-.009
R ²	.094	.034	.031	0.042	.070	.029	.055		.045	.068	.031	.052	.074
Adjusted R ²	.058	-.005	-.007	0.004	.033	-.010	.018		.008	.032	-.007	.014	.036

* Significant at the 0.05 level.

** Significant at the 0.01 level.

Appendix P. References.

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