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Environmental Uncertainty Perceptions, Decision-Maker
Characteristics and Work Environment Factors on the
Perceived Usefulness of Marketing Information
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ABSTRACT

This paper discusses potential relationships between contextual factors and Marketing Information Systems (MkIS) design. MkIS design is defined in terms of the perceived usefulness of several information characteristics, which may be associated with a marketing information system. The paper suggests that MkIS design research should consider a range of contextual variables drawn from the organisational behaviour, behavioural decision-making and personality/cognitive psychology literatures. Drawing on empirical results from three sets of literature and from studies of information systems design (particularly management and accounting information systems design), the authors present a framework for exploring the design of a MkIS.

Introduction

Conceptual and empirical work in the information systems literature suggest that the performance of an information system is influenced by the fit between information system characteristics and contextual variables (e.g., Tushman and Nadler, 1978). Success (the benefits to be derived from the information system) is viewed as a function of the fit between these contextual variables and information system characteristics. Relatively little attention however, has been given to what kind of information marketing decision-makers regard as useful in performing their marketing tasks within MkIS research. As Proctor (1991) states: “*there is plenty of information around, but too much of the wrong kind and not enough of the right kind*” (Proctor 1991, p. 55). Proctor (1991) further notes that the kinds of complaints usually encountered regarding information are: the information is too dispersed to be useful, it arrives too late to be useful, and it arrives in a form that leaves no idea of its accuracy and therefore lacks orientation or focus.

Accounting and Management Information systems research has made use of concepts from the field of cognitive psychology to explain perceptions of what information is perceived as useful. Studies by Dermer (1973), Gordon and Miller (1976), Gordon et al (1978), Gordon and Narayanan (1984), Chenhall and Morris (1986), and Choe and Lee (1993) suggest that it is useful to consider information requirements/needs for decision-making in terms of general information characteristics. These information requirements are the user specifications of information characteristics involved in information seeking. Information characteristics refer to those qualities of information perceived by managers to be useful, such as aggregation, orientation, time horizon,

financial/nonfinancial, frequency of reporting and speed of reporting (e.g., Gorry and Scott-Morton, 1971; Gordon et al, 1978; Gordon and Narayanan, 1984; Chenhall and Morris, 1986; Mangaliso, 1995). These MAS and MIS researchers contend that by identifying the dimensions of information, the designers of an information system are more in tune with those qualities or characteristics of information perceived by decision-makers to be useful in performing their work tasks. Information is useful to an individual to the extent that it improves decision-making and hence the operating efficiency and effectiveness of the organisation (Chenhall and Morris, 1986; Mangaliso, 1995).

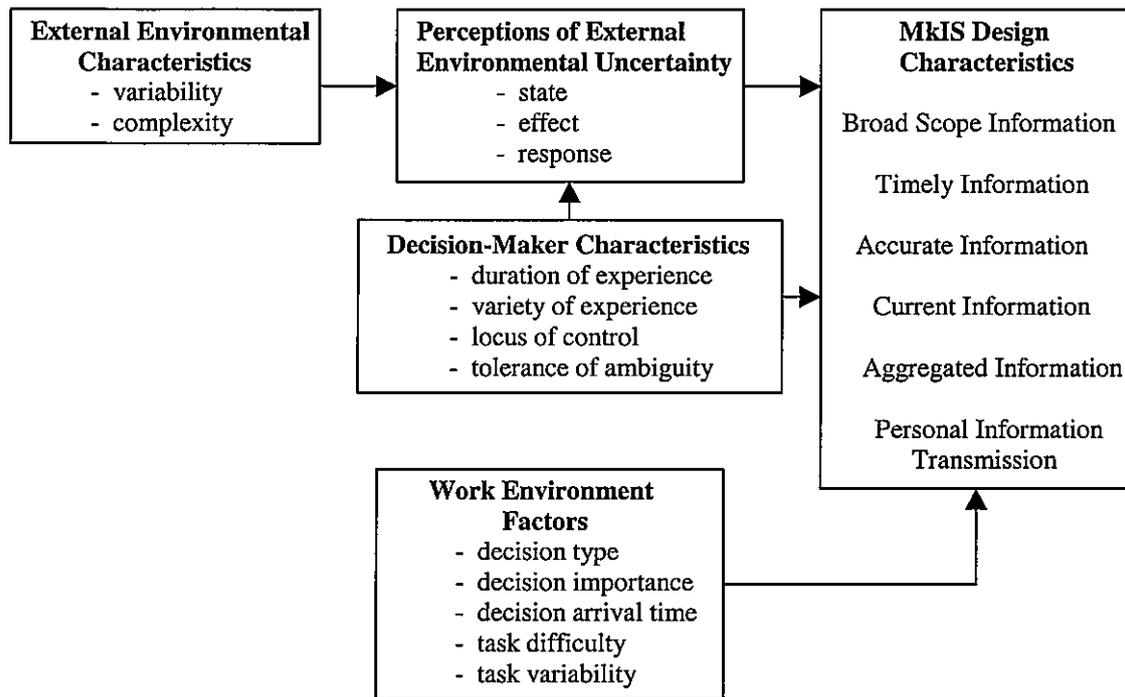
Although studies in MAS and MIS research have enhanced an understanding of what types of information are appropriate in different situations or contexts, there appears to have been no conceptual and empirical investigation of information characteristics in MkIS research. The purpose of this paper is to outline a conceptual framework to illustrate the potential impact of contextual factors on the perceived usefulness of a range of marketing information characteristics. The paper is organised into seven sections. In the first section the conceptual framework is presented and numerous MkIS design characteristics are defined. The next five sections develop research propositions under the key headings: (1) external environment factors influencing environmental uncertainty perceptions, (2) decision-maker characteristics influencing environmental uncertainty perceptions, (3) environmental uncertainty perceptions influencing the perceived usefulness of marketing information characteristics, (4) decision-maker characteristics influencing the perceived usefulness of marketing information characteristics, and (5) work environment factors influencing the perceived usefulness of marketing information characteristics. The final section proposes the next stages for empirical work.

Conceptual Framework

The very core of MkIS design is the identification of the information needs the system is to provide to marketing decision-makers. A proposed conceptual framework for the study of MkIS design is presented in Figure 1. The framework draws on three key literature bases and illustrates three categories of antecedents of the usefulness of marketing information characteristics: environmental uncertainty perceptions, decision-maker characteristics and work environment factors. Environmental uncertainty perceptions are also shown to be affected by external marketing environment factors and decision-maker characteristics. The first category, environmental uncertainty perceptions, are drawn from conceptual frameworks and empirical investigations in organisational design and behavioural decision-making; the second category, decision-maker factors, are drawn from the personality and cognitive psychology literatures; the third category, work environment factors, are drawn from theories of managerial information processing.

Using the conceptual frameworks developed by Gorry and Scott-Morton (1971), and the empirical work cited in the information systems literature, the authors suggest that MkIS design can be considered in terms of several information characteristics or dimensions. These dimensions include scope, timeliness, aggregation, currency, accuracy and personal information transmission.

Figure 1: A Conceptual Framework of Factors Affecting the Perceived Usefulness of MkIS



Information scope represents the scope of events, places, people, and things that are represented by information (Gorry and Scott-Morton, 1971; Senn, 1987). Timeliness refers to receiving information quickly and on time to make decisions (e.g., Chenhall and Morris, 1986; Mangaliso, 1995). This includes information that is provided on request (e.g., on-demand reports) and the provision of systematic reports containing information that has been routinely collected (reports may be produced very frequently or very seldom depending on the user's need). Information aggregation refers to the degree of summarisation performed on the information in order to facilitate decision-making (e.g., Chenhall and Morris, 1986; Specht, 1986; Mangaliso, 1995). A MkIS can provide information in various forms of aggregation ranging from the provision of raw marketing data to a variety of aggregations around periods of time and areas of responsibility such as product/markets. Information currency refers to the age of the information appropriate for decision-making (Senn, 1987; Li, 1997), and describes the length of time between something occurring and the event being reflected in the information. Information accuracy refers to the extent to which the output information is sufficiently correct to satisfy its intended use (Li, 1997). Personal information transmission describes the use of personal information sources to acquire

information to facilitate decision-making (Kaye, 1995)¹. Personal sources deliver information to the individual decision-maker, and may be formal (written) or informal (verbal)².

The key premises which underlie the framework in Figure 1 are as follows:

- i) **Perceptions of Environmental Uncertainty:** It is proposed that state, effect and response uncertainty are affected by a) external marketing environment factors, including (1) variability of the external marketing environment, (2) complexity of the external marketing environment, and b) decision-maker characteristics, including (1) duration of experience, (2) variety of experience, (2) tolerance of ambiguity and (3) locus of control.
- ii) **Environmental Uncertainty Perceptions and the Perceived Usefulness of Marketing Information Characteristics:** It is proposed that perceptions of state, effect and response external environmental uncertainty are linked to the perceived usefulness of marketing information characteristics.
- iii) **Decision-Maker Characteristics and the Perceived Usefulness of Marketing Information Characteristics:** It is proposed that decision-makers with different behavioural and psychological profiles will perceive the usefulness of marketing information characteristics differently.
- iv) **Work Environment Factors and the Perceived Usefulness of Marketing Information Characteristics:** It is proposed that the perceived usefulness of marketing information characteristics are affected by a range of work environment factors, including (1) type of marketing management decision, (2) importance of the marketing management decision, (3) decision arrival time, (4) marketing task difficulty, and (5) marketing task variability.

The authors discuss the components of this framework as follows, and develop a set of specific research propositions for empirical study.

External Environmental Factors Influencing Environmental Uncertainty Perceptions

The level of uncertainty faced by decision-makers has been cited as an important determinant of behaviour in both psychological decision theories and theories of organizational design (e.g., Thompson, 1967; Lawrence and Lorsch, 1967; Duncan, 1972). Environmental uncertainty exists

1 Empirical work in marketing has shown that personal sources have a role in providing information needed by decision-makers (e.g., Deshpande and Zaltman 1987; Maltz and Kohli 1996; Wright and Ashill 1998).

2 For example, an industry association contact might be a personal source of information for a marketing decision-maker, but that piece of information could be given orally (verbal) or in writing. Kaye (1995) refers to medium to describe whether the information source is written (documentary) or verbal (oral).

when decision-makers do not feel confident that they understand what the major events or trends are, or when they feel unable to accurately assign probabilities to the likelihood that particular events and/or changes will occur (Duncan, 1972; Milliken, 1987). The most commonly cited definitions describe environmental uncertainty as a perceptual phenomenon (e.g., Weick, 1969; Duncan, 1972; Downey and Slocum, 1975; Downey et al, 1977; Tung, 1979; Daft and Weick, 1984; Milliken, 1987), but diverge when specifying the nature of the uncertainty which is experienced. The three most common definitions to be found in the literature are:

- a) an inability to assign probabilities to the likelihood of future events (e.g., Duncan, 1972; Milliken, 1987).
- b) a lack of information about cause-effect relationships (e.g., Duncan, 1972; Milliken, 1987) and/or
- c) an inability to predict accurately what the outcomes of a decision might be (e.g., Duncan, 1972; Downey and Slocum, 1975; Milliken, 1987).

Milliken (1987) suggested that there are three types of uncertainty about environments which may account for these different definitions. These uncertainty types are called state uncertainty, effect uncertainty and response uncertainty. State uncertainty occurs when a decision-maker perceives an organisation's environment to be unpredictable. Here, managers do not feel confident that they understand what the major events or trends in an environment are or feel unable to accurately assign probabilities to the likelihood that particular events or changes will occur. Effect uncertainty refers to the inability to predict the nature of the effect of a future state of the environment on the organization i.e., an understanding of cause-effect relationships. This type of uncertainty is more specific than state uncertainty because the experience involves an inability to understand the impact of events on the organisation, not an inability to predict the state of the external environment. The final uncertainty type Milliken (1987) described is response uncertainty. This represents an inability to predict the likely consequences of a response choice, and is experienced when decision-makers attempt to understand the range of strategic responses open to them and attempt to evaluate the relative utility of possible options.

The level of decision-maker environmental uncertainty is well established in the organisational and managerial information processing literature to be dependent on two environmental characteristics: environmental variability and environmental complexity.³ Environmental variability refers to the frequency and magnitude of change in the external environment and its degree of predictability

³ In the marketing literature, a paper by Menon and Varadarajan (1992) has also discussed conceptually the firm's environment in terms of these two environmental dimensions.

(e.g., Child, 1972; Duncan, 1972; Tung, 1979; Glazer and Weiss, 1993). Perceived environmental complexity refers to the degree to which the task environment has relatively few elements versus a large number of factors all of which may be different from one another (Child, 1972; Duncan, 1972; Gordon and Miller, 1976; Aldrich, 1979; Tung, 1979). An external environment with high complexity would contain many customers, many final users (consumers) and many competitors for the organisation's product, with high dissimilarity among them.

Conceptually, the authors expect that marketing decision-makers who function in external marketing environments with higher variability and complexity will perceive more uncertainty about the state of the marketing environment than those decision-makers who function in less variable and less complex marketing environments. Higher variability and complexity may also mean higher decision-maker uncertainty about the effect of the future state of events on the organisation (effect uncertainty) and higher uncertainty as to the likely consequences of a response choice (response uncertainty). If the factors comprising the decision-maker's external marketing environment are in a constant state of flux (there is frequent and unpredictable change), it becomes more difficult to keep up-to-date with the changes and their implications, thus perceived environmental uncertainty increases (Thompson, 1967; Duncan, 1972; Downey and Slocum, 1975; Tung, 1979; Milliken, 1987; Achrol and Stern 1988). The authors also propose that decision-makers facing a more complex external marketing environment will perceive greater state, effect and response environmental uncertainty than decision-makers confronting a more simple external marketing environment. Simple environments are those with few elements which are similar to each other and are well understood. Complex environments have a large number of factors which are quite different from each other and their interrelationships are difficult to comprehend. As the number and diversity of environmental factors increases, they increasingly limit the decision-maker's cognitive abilities to grasp and comprehend the relationships that exist among them (it becomes more difficult to analyse cause/effect relationships) and predict the outcomes of external events, and therefore perceived environmental uncertainty increases (e.g., Child, 1972; Duncan, 1972; Downey and Slocum, 1975; Aldrich, 1979; Tung, 1979; Achrol and Stern 1988).

Decision-Maker Factors Influencing Environmental Uncertainty Perceptions

In addition to the external environment characteristics cited above, conceptual and empirical work by Dermer (1973), Downey and Slocum (1975), Downey et al (1977) identify other sources of environmental uncertainty which are separate from environmental characteristics. These authors suggest that in addition to environmental uncertainty from variability and complexity, perceived environmental uncertainty may vary as a function of individual cognitive processes and individual

experience.⁴ If we accept that environmental uncertainty may be thought of as an attribute of an individual's behavioural environment (the environment perceived to and reacted to by an individual) rather than an attribute of the physical environment (the objective environment), then it appears feasible to test the possible role of individual differences in the evaluation of external environments. There are many individual differences relating to decision-making behaviour but three individual characteristics in particular, are well documented in the behavioural decision-making and cognitive psychology/personality literatures. These are decision-maker experience, tolerance of ambiguity and locus of control.

Experience

Decision-maker experience refers to the the accumulation of relevant experiential information by the decision-maker (e.g., Downey and Slocum, 1975; Downey et al, 1977; Daft and Weick, 1984; Ashford and Cummings, 1985; Perkins and Rao, 1990). Experience represents the behavioural responses to given environmental characteristics, rather than an individual's innate qualities i.e., cognitive processes, which refer to the cognitive structures maintained by individuals to facilitate their adjustments to situations they encounter (Gough, 1976). Such innate qualities include decision-maker tolerance of ambiguity and locus of control. Both are reviewed later in this section.

The basic proposition might be that a greater variety and duration (though not necessarily duration) of individual experience will increase the behavioural repertoire of the individual in that he or she can respond appropriately to the demands of the external environment, thus individuals with greater experience may experience situations as less uncertain than individuals with lower levels of experience (e.g., Downey and Slocum, 1975; Downey et al, 1977; Daft and Weick, 1984; Perkins and Rao, 1990). Greater experience increases the individual's ability to draw on a greater behavioural repertoire in coping with an external environment. The authors expect that this increased behavioural repertoire may be negatively related to perceptions of state, effect and response environmental uncertainty. Through experience, decision-makers improve their skills and develop a more elaborate and comprehensive knowledge of marketing situations, customer types and potential marketing strategies.

Tolerance of Ambiguity

The cognitive psychology literature provides a long and rich description of ambiguity tolerance as a personality variable affecting behaviour (e.g., Budner 1962). Tolerance of ambiguity refers to the evaluative tendencies of the individual decision-maker, and describes the degree to which

⁴ In the marketing literature, the conceptual work on knowledge utilisation by Menon and Varadarajan (1992) has also recognised the prior dispositions of managers to describe individual differences such as the level of experience, level of knowledge, and cognitive styles.

individuals can hold back their need for a perfect, clear view of the environment. Davis and Olson (1985) describe this personality trait as the extent to which an individual needs clarity and specificity versus vague, unclear rules, directions, procedures and so on in their work situations (the extent to which an individual can tolerate or cope with ambiguity). Individuals intolerant of ambiguity i.e., those who have lower tolerance, perceive ambiguous situations as a source of threat and behave in a manner to reduce this threat (e.g., Budner, 1962; Dermer, 1973; Dollinger, 1984; Specht, 1987). These individuals have been shown to prematurely close their information processing activities and be rigidly impervious to new information (Wang and Chan, 1995). By contrast, individuals tolerant of ambiguity have been shown to spend a larger proportion of time performing environmental scanning activities to keep abreast of environmental changes (e.g., Dollinger, 1984; Govindarajan, 1989; Wang and Chan, 1995).

These cognitive differences may result in individuals more intolerant of ambiguity to perceive the external environment as more uncertain than individuals more tolerant of ambiguity. Specifically, the authors suggest that marketing decision-makers with lower ambiguity tolerance may perceive the future state of the external environment, the effect of this future state on the organisation, and the consequences of a response choice, to be more uncertain than decision-makers with a higher tolerance of ambiguity.

Locus of Control

The second personality trait shown in Figure 1 is decision-maker Locus of Control. While there has been considerable research on this trait in information systems design (e.g., Vandenbosch and Huff, 1997), the personality variable has been largely ignored in MkIS research. Locus of control represents an individual's beliefs concerning his or her control over their environment (Rotter, 1966). These beliefs range from weak or no personal control (external locus of control) to strong personal control (internal locus of control). Internals have been shown to be more proactive in the acquisition and utilisation of information than externals, and are more likely to keep up to date with changes in the external environment (e.g., Miller and Toulouse, 1986; Govindarajan, 1989).

From a theoretical perspective, one would expect that individuals with an external locus of control would find their work environment more threatening. We therefore expect a positive relationship between locus of control and state, effect and response uncertainty. As decision-maker locus of control increases (more external control)⁵ perceptions of state, effect and response external environmental uncertainty are expected to increase. If marketing decision-makers perceive that

⁵ Low scores on the LOC scale mean more internal control, higher scores mean more external control (e.g., Rotter 1966).

they have more personal control over the environment (more internal locus of control), they might perceive the state of the external marketing environment, the effect of this future state on the organisation and the consequences of response options, to be more certain than marketing decision-makers who have more external locus of control.

The link between these external environmental uncertainty types and the perceived usefulness of marketing information characteristics, together with other contextual factors shown in Figure 1, are now developed.

External Environment Uncertainty Perceptions Influencing the Perceived Usefulness of Marketing Information Characteristics

The relationship between the perceived usefulness of information system characteristics and the contextual variable of perceived environmental uncertainty has been studied by numerous MAS and MIS writers (e.g., Gordon and Miller 1976; Gordon and Narayanan 1984; Chenhall and Morris 1986; Gul and Chia 1994; Mangaliso 1995)⁶. For example, Gordon and Narayanan (1984), Govindarajan (1984), and Chenhall and Morris (1986) identified a positive relationship between environmental uncertainty and the perceived usefulness of information that has broad scope (information that is related to the external environment, is nonfinancial and is future orientated information)⁷. Similarly, these studies reported a positive relationship between environmental uncertainty and the perceived usefulness of timely information (described as information that is presented on request, is frequent, reports on the most recent events and provides rapid feedback on decisions). Although this definition includes the dimension of information currency to describe the characteristic of information timeliness, the authors suggest that timely information and current information are two distinct information dimensions. Information may facilitate decision-making because it is received quickly and is on time, but it may not be current because it does not report on the most recent events.

These MAS and MIS research (e.g., Gordon and Narayanan, 1984; Chenhall and Morris, 1986; Gul and Chia, 1994; Mangaliso, 1995) and more recently Wright and Ashill (1998) in MkIS research, have also shown environmental uncertainty to have a positive impact on the perceived usefulness of aggregated information. Chenhall and Morris (1986) argued that managers perceived aggregated information (information which may be aggregated around time periods, functional areas and summarisation in formats consistent with formal decision models) to be more useful in uncertain

6 This work however, fails to make a distinction between the different types of environmental uncertainty advocated by Milliken (1987) and focuses on a single overall measure or summative index of environmental uncertainty.

7 These studies represent an acceptable description of information scope for management accounting studies but there have been no studies in MkIS research describing marketing information scope.

external environments because this information helps them see the bigger picture and enhances their ability to use intuition and judgement. In MkIS research, Wright and Ashill (1998) in a qualitative study of contingency factors affecting MkIS design, also found environmental uncertainty through environmental complexity (many markets, customers and suppliers) to be related to the level of information summarisation. This work showed that marketing decision-makers find it more difficult to gather and understand information about a large number of environmental factors, which are dissimilar at higher levels of environmental uncertainty, and therefore seek more aggregated information.

Perceived environmental uncertainty has also been linked to the information characteristic of information source in the managerial information processing literature. Personal information sources are more important to decision-makers when uncertainty is high because they provide multiple cues to reduce equivocality and allow for more rapid feedback thereby facilitating understanding (e.g., Holland et al, 1976; Daft and Lengel, 1986; Specht, 1987). By contrast, impersonal information sources are more likely to be appropriate when environmental events are discrete and analysable because equivocality is low. Equivocality is related to the analysability of cause-effect relationships and refers to the existence of multiple and conflicting interpretations about an organizational situation (e.g., Daft and Macintosh, 1981). When environmental relationships are clear and analysable, equivocality is low. But when cause-effect relationships are unclear i.e., there is a lack of understanding, equivocality is higher and information processing must reduce equivocality.

Given the above findings and conceptual arguments, the authors expect that as state, effect and response environmental uncertainty increase, marketing decision-makers will perceive broad scope marketing information to be more useful to facilitate marketing decision-making. Support for this proposition draws on the belief that marketing decision-makers are involved with marketing tasks which entail dealing with environmental events that are uncertain (given a marketing decision-maker's boundary spanning role). Where there are more simple, stable and predictable marketing environments, and therefore less environmental uncertainty, there is little or no change in the technology required to produce goods as time passes, and competitors tend to behave in a predictable fashion in terms of their product market orientations. In contrast, perceived environmental uncertainty resulting from a more complex and dynamic external marketing environment, means that customer tastes shift more rapidly and are more unpredictable, new technologies and sources of supply often arise, and competitors introduce many more new products. The same type of marketing information cannot serve the needs of decision-makers in both task environments equally well. There is then intuitive appeal of the proposition that marketing

information broad in scope (for example information on competitor actions, consumer tastes, shifting demographic factors), should be perceived as more useful by marketing decision-makers when perceptions of state, effect and response environmental uncertainty increase.

The authors also expect that decision-maker ability to respond to uncertainty in the external environment will be influenced by the timeliness and currency of marketing information. Specifically, we suggest that when faced with state, effect and response uncertainty, the decision-maker will find timely information (information received quickly and on time) and current information (information which reports on the most recent events) more useful to cope with these types of uncertainty. Marketing information delivered to the marketing decision-maker in a timely manner and reporting on the most recent events, should be more useful when making marketing decisions under higher state, effect and response uncertainty. Similarly, as perceptions of environmental uncertainty (state, effect and response) increase, marketing decision-makers will find aggregated information (summarised marketing data) and accurate information (information which is sufficiently correct to satisfy its intended use) more useful to facilitate marketing decision-making. The decision-maker's inability to accurately assign probabilities to the likelihood that events/changes will occur, predict the effect of a future state of the external environment on the organisation, and predict the likely consequences of a response choice (Milliken 1987) may mean that he or she will perceive aggregated information and accurate information to be more useful to facilitate marketing decision-making. Finally, the authors propose a positive relationship between perceptions of environmental uncertainty (state, effect and response) and the perceived usefulness of personal information transmission. Marketing information sources personal in nature provide multiple cues to reduce equivocality because they deliver information direct to the decision-maker, thereby facilitating greater understanding.

Decision-Maker Factors Influencing the perceived usefulness of Marketing Information Characteristics

Tolerance of Ambiguity

Tolerance of ambiguity is also important in our conceptual model because it plays a role in an individual's decision to seek information from the external environment. The cognitive psychology/personality literatures cite two views on individuals seeking information from the external environment (e.g., Budner, 1962; Dermer, 1973; McGhee et al, 1978; Ashford and Cummings, 1985). The first view advocates individuals who are more intolerant of ambiguity, to be less confident in their decisions, and these individuals seek more information than individuals who are more tolerant of ambiguity. Individuals more intolerant find ambiguity a source of psychological threat and they are more motivated to resolve it through greater information-seeking

behaviour (e.g., Budner, 1962; Duncan, 1972; Dermer, 1973; McGhee et al, 1978; Ashford and Cummings, 1985). By contrast, individuals who are more tolerant do not find ambiguity aversive i.e., they are not fearful of it (Vandenbosch and Huff, 1997). As a consequence they are less motivated to reduce it and do not respond by seeking out more information from the external environment. The second view advocates that individuals who are more intolerant of ambiguity may ignore it or fail to recognise it, or act as if there were no ambiguity, and therefore seek less information from the external environment than individuals who are more tolerant of ambiguity (e.g., Dollinger, 1984).

There exists no empirical work examining tolerance of ambiguity in MkIS research. Given these two views on information seeking behaviour in the cognitive psychology literature, individuals may exhibit different information processing behaviours depending on their level of ambiguity tolerance. Conceptually, we take the view that those individuals more intolerant of ambiguity find ambiguity a source of psychological threat and are more motivated to resolve this threat through higher information-seeking behaviour. Marketing decision-makers may therefore perceive the usefulness of information characteristics differently depending on their ambiguity tolerance level. Specifically, we suggest that marketing decision-makers who are more tolerant of ambiguity will perceive marketing information broad in scope to be less useful than decision-makers who are more intolerant of ambiguity. Therefore as tolerance of ambiguity increases, a negative relationship with the perceived usefulness of broad scope marketing information is expected. Similarly, if we accept that individuals more intolerant of ambiguity perceive vagueness and unclearness as a source of psychological discomfort and threat and are more motivated to resolve this discomfort, they will perceive timely information and accurate information to be more useful to combat the ambiguity. A relationship between tolerance of ambiguity and personal information transmission is also expected. Dollinger (1984) concluded that decision-makers more intolerant of ambiguity focus more on the least ambiguous information because they are less able to cope with the ambiguity. Personal information sources are less ambiguous than impersonal information sources because they involve direct contact with individuals and allow for more rapid feedback, thereby facilitating greater understanding (e.g., Dollinger, 1984; Specht, 1987). Conceptually, we therefore expect that at higher levels of tolerance of ambiguity, personal information transmission will be less useful to facilitate marketing decision-making.

Locus of Control

The cognitive psychology literature also acknowledges that a general perception of control, called Locus of Control occupies a central place in determining an individual's actions. This literature suggests that internals and externals exhibit different information processing behaviours. Phares

(1976) and Lefcourt (1982) concluded that internals prefer greater control over their work environments and are more perceptive of, and ready to learn about their surroundings. They are also more apt to recognise the relevance of information for their purposes than externals, and have a greater tendency to gather and use information in decision-making (e.g., Davis and Phares, 1967; Phares 1976; Govindarajan, 1989). The logic behind the greater information processing capability of people with an internal locus of control is based on the presumed construct properties of the internal-external locus dimension. Internal locus individuals, having a high expectancy that rewards are a function of their own efforts, should seek task-related information actively, since they are likely to see information acquisition as a pathway towards reinforcement.

Given these conceptual arguments and empirical findings, the authors suggest that marketing decision-makers may not respond uniformly to the importance placed on marketing information characteristics. Perceptions of information usefulness may differ depending on decision-maker locus of control. For example, decision-makers who have more internal locus of control may perceive broad scope marketing information to be more useful than decision-makers who have more external locus of control. We therefore expect a negative relationship between decision-maker locus of control and the perceived usefulness of broad scope marketing information. Also, given that individuals with more internal locus of control are more likely to keep up with what is going on in the external environment, they may also find timely marketing information and current marketing information to be more useful to facilitate marketing decision-making. We therefore expect a negative relationship between decision-maker locus of control and the perceived usefulness of timely and current marketing information.

Work Environment Factors Influencing the Perceived Usefulness of Marketing Information Characteristics

Conceptual and empirical work drawn from the managerial information processing literature (e.g., Mintzberg et al, 1976; Jones and McLeod, 1986; Goodman, 1993) suggests that work factors can also be important determinants of the information needs of individuals. These factors include decision type, decision importance, decision arrival time, task difficulty and task variability, and are reviewed in this next section.

Decision Type

The conceptual work of Gorry and Scott-Morton (1971) and the empirical work of Mintzberg (1973) and Jones and McLeod (1986) suggest that information needs vary with the type of decisions to be made. White (1986) states the perennial problem for the designers of information systems is to understand what problems individuals face in their work. These problems may be

defined by the decisions which an individual performs (Anthony, 1965; Gorry and Scott-Morton 1971). For example, strategic planning activities typically require information broad in scope for any given decision. Such activities involve examining a wide range of factors that often cannot be anticipated, whereas operational type activities frequently require a more well defined and narrow set of information inputs (Anthony, 1965; Gorry and Scott-Morton, 1971). Although empirical studies relating decision-making purpose/type to information characteristics are sparse, they do indicate that different information characteristics should be selected to fit the different decision-making purposes of the users (e.g., Specht, 1986).

Marketing management decisions can be classified according to whether they are short-term operational decisions or long-term strategic decisions (e.g., Piercy and Evans, 1983; Talvinen, 1994). Strategic marketing management decisions focus on monitoring the external marketing environment of the organisation for strategic choices to be made regarding product markets, appropriate strategy options, and relative investments in terms of time and money. Operational marketing management decisions revolve around the collection of information about the organisation's customers, distributors, competitors and marketing results for shorter-term decision-making, such as product policy decisions (launches, modifications, withdrawals), pricing policy (levels, discounts etc) and so on (Piercy and Evans, 1983). Operational marketing decisions tend to be narrowly defined and represent quite specific problems that need to be handled within a relatively short time, whereas strategic marketing decisions tend to be more broadly defined with longer-term time horizons and require a broader range of information inputs.

Conceptually, the authors expect a positive relationship between the type of marketing management decisions and the perceived usefulness of broad scope marketing information. Marketing decision-makers will perceive broad scope marketing information to be more useful for marketing management decisions which have a greater strategic orientation. Gorry and Scott-Morton (1971) for example, concluded that decisions which are more strategic in nature are more likely to demand information about future growth and trends (future-orientated information), and information more qualitative in nature. We also propose a positive relationship between the type of marketing management decision and the perceived usefulness of aggregated information. Aggregated information will be perceived to be more useful for strategic marketing decisions over operational marketing decisions because decision-makers want to see more trends, relationships and forecasts in monitoring the external environment.

Decision Importance and Decision Arrival Time

Decision arrival time and perceived decision importance represent garbage can concepts which can be found in the decision process framework of Mintzberg et al (1976). The garbage can theory of management decision-making proposes a decision-making model which recognises factors which "prevent a steady, undisturbed progression from one routine to another, and instead create a dynamic, open system process subjected to interferences, feedback loops and dead ends" (Saunders and Jones 1990). One example is decision importance which has been identified as a factor affecting managerial information seeking behaviour (Saunders and Jones, 1990; Goodman, 1993). One guide to the importance of a decision is an assessment of the repercussion of a mistake (Stewart, 1985). Similarly, Goodman (1993) in a review of the managerial information processing literature, and Wright and Ashill (1998) in MkIS research, refer to the economic and psychological costs of making the wrong decision. Decision arrival time is another garbage can concept and refers to the time element associated with making a decision i.e., the gap between when it becomes clear that a decision must be made and the time when the decision needs to be made (Goodman 1993). Mintzberg et al (1976) for example, discussed the effects of time limitations on the way managers process information.

Conceptually, the authors expect a positive relationship between perceived decision importance and the perceived usefulness of timely marketing information. Also, as decision importance increases, we propose that the perceived usefulness of accurate information will increase. The greater the importance of decision tasks, the more formal, careful, and complete the decision processes and therefore accurate marketing information will be required. Finally, a negative relationship between decision arrival time and the perceived usefulness of timely marketing information is expected. As decision arrival time increases i.e., there is more time available before making a decision, timely marketing information (receiving information quickly and on time) will be perceived as less useful to facilitate marketing decision-making.

Marketing Task Difficulty and Variability

It is acknowledged in the behavioural decision-making literature that perceptions of information usefulness depend on the complexity or uncertainty of the individual's task/work activities. Tasks impose information requirements that must be met if they are to be completed. The complexity or uncertainty associated with tasks has been defined in terms of the dimensions of task difficulty and task variability (e.g., Perrow, 1967; Van de Ven et al, 1976; Van de Ven and Ferry, 1980; Daft and Macintosh, 1981; Sanders and Courtney, 1985)⁹. Task difficulty focuses on the analysability and predictability of the search process that individuals undertake when they encounter a task or

⁸ Marketing management decisions can be grouped according to whether they have an operational or strategic orientation.

⁹ The concept of task complexity has also been identified in the marketing literature by Menon and Varadarajan (1992).

problem. It describes the degree to which the individual decision-maker can follow a formal and well-defined procedure to solve a problem. The analysability of work is the ease and clarity of knowing the nature and order of tasks to be performed. The predictability of the work is the ease with which an individual can determine in advance what the outcomes of a particular sequence of steps will be. At the one extreme of task analysability and predictability, the search process is completely 'programmed'; at the other extreme, it is completely 'non-programmed'. When tasks are not analysable, problems become so vague and poorly conceptualised that the decision-maker must spend considerable time thinking about how to diagnose the problem and select an appropriate problem-solving strategy. The second dimension of task complexity is task variability. Variability describes the number of exceptions encountered in the characteristics of the work, and reflects the extent to which activities can be structured in a routinised, systematised or mechanised way.

Numerous organisational theorists have empirically linked task complexity to variations in information requirements (e.g., Tushman 1979; Van de Ven and Ferry 1980). These studies show that jobs that are more complex require different information characteristics than simpler, more routine jobs. Studies of managerial information processing have also examined the relationship between information characteristics and task difficulty/variability (e.g., Gordon et al 1978; Larcker, 1981; Tiamiyu, 1992; Choe and Lee, 1993; Zeffane and Gul, 1993; Chong, 1996). These studies reported a positive relationship between task uncertainty (difficulty and variability) and MAS information broad in scope (external, future and nonfinancial information), aggregated information and timely information. Information sources also differ to the extent to which they provide information for resolving difficult and variable tasks (Daft and Lengel, 1986). Although the usefulness of personal and impersonal information sources have not been widely studied, the relationship between task complexity (task difficulty and task variability) and information source use has been extensively investigated in studies of information acquisition behaviour (e.g., Holland et al, 1976; Van de Ven et al, 1976; Tushman, 1979; O'Reilly, 1982; Tiamiyu, 1992; Bystrom and Jarvelin, 1995). These studies found that when task uncertainty (task difficulty and variability) increased, the use of impersonal sources dropped, while the use of personal information sources increased.

In light of the above, the authors expect a positive relationship between marketing task difficulty and the perceived usefulness of broad scope marketing information, and marketing task variability and broad scope marketing information. As marketing tasks become more difficult (work becomes more difficult to analyse and its outcome predicted) and variable (the number of exceptions encountered in the work increases), marketing decision-makers will perceive marketing information broad in scope more useful to accomplish them. Similarly, we propose a positive relationship

between marketing task difficulty and the perceived usefulness of timely marketing information, and marketing task variability and timely marketing information. As tasks increase in difficulty and variability, preplanning becomes more problematic and there is a greater need for marketing information on an ongoing basis and on time. Zeffane and Gul (1993) for example, found that as task analysability increased, the need for more solutions increased, and so the need to obtain information frequently and on time became more prevalent. Marketing decision-makers may also respond to higher task difficulty and task variability by demanding aggregated information. We therefore propose that aggregated marketing information will be perceived as more useful to facilitate decision-making for more difficult and variable tasks. As marketing tasks increase in difficulty and variability they inherently become more unclear and ambiguous, and aggregated information will be perceived to be more useful to accomplish them. Finally, we propose a positive relationship between marketing task difficulty/variability and the perceived usefulness of personal information transmission. When task difficulty and task variability increase, decision-makers will find personal information transmission more useful because information sources personal in nature enable a decision-maker to learn about a complex tasks or problems more quickly. As tasks become more difficult i.e., they become less analysable and more unstructured, and variable i.e., less routine, equivocality increases and decision-makers perceive personal information transmission to be more useful to reduce this equivocality. Information sources personal in nature will be perceived to be more useful because they provide multiple cues and feedback that enable the decision-maker to define what is happening and respond appropriately (e.g., Holland et al, 1976; Van de Ven et al, 1976; Tushman, 1979; Tiarniyu, 1992).

Summary

This paper has presented a conceptual framework and research propositions to study those factors potentially important to MkIS design. The framework suggests that the information requirements/needs of marketing decision-makers can be defined in terms of a set of information qualities or characteristics. Conceptual and empirical work in the information systems literature suggests that the performance of an information system is influenced by the 'fit' between information system characteristics and context. By defining MkIS design in terms of a set of information characteristics, MkIS designers may be more in tune with those information qualities perceived by decision-makers to be useful in performing their tasks.

The propositions advanced in this paper posit that MkIS design should be aligned to a range of contextual factors. The insights gained from multidisciplinary streams of literature such as cognitive psychology, organisational theory, behavioural decision-making and information systems can enhance our understanding of how contextual factors affect the usefulness of marketing

information characteristics. Specifically, the conceptual framework outlined in this paper illustrates potential relationships between marketing information characteristics and the context of a marketing decision-maker's operating situation. External environment factors (variability and complexity), environmental uncertainty perceptions (state, effect and response), decision-maker characteristics (experience, tolerance of ambiguity and locus of control) and work environment factors (decision type, decision importance, decision arrival time, task difficulty and task variability), are potentially important dimensions of context in a study of MkIS design. User specifications of information characteristics may depend on the external environment and work conditions that decision-makers have to deal with.

While there has been empirical work examining the relationship between external environment and decision-maker factors and environmental uncertainty perceptions in the behavioural decision-making and cognitive psychology literatures, there has been no attempt to examine these variables in MkIS research. Moreover, no attempt has been made to examine the relationship between these factors and the three environmental uncertainty types advocated by Milliken (1987). Knowledge of marketing decision-makers dealing with information under varying conditions of external environmental uncertainty, and confronting different work environments, could help in the more effective design of a MkIS. There is also a volume of work in the information systems literature that suggests that information systems design cannot be effective without consideration of the decision-maker. Personality traits for example, play a role in an individual's decision to seek information from the external environment. Tolerance of ambiguity and locus of control have not been the subject of empirical work in MkIS research, but they are potential factors influencing the importance decision-makers place on information characteristics, and therefore their information needs/requirements.

The main aim of future research should be to confirm the viability of the proposed conceptual framework and propositions, and to investigate and establish the most suitable research design to accomplish this objective. Exploratory in-depth interviews with marketing managers should be undertaken to ascertain the appropriateness of all the variables and the relationships proposed by the conceptual framework. The authors believe that results of future research may sensitize designers of the facets of MkIS to the underlying qualities or characteristics of marketing information perceived by decision-makers to be useful. By specifying information needs in terms of user specifications of information characteristics and recognising that these information needs may depend on the context in which marketing decision-making takes place, MkIS designers can design systems to ensure that information with these characteristics are made available.

Specifying information needs at the

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