

# Working Paper Series

## **An Empirical Investigation of the Factors Affecting the Scope of Information Needed in a MkIS**

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**AN EMPIRICAL INVESTIGATION OF THE  
FACTORS AFFECTING THE SCOPE OF  
INFORMATION NEEDED IN A MKIS**

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**ABSTRACT**

Perceptions of environmental uncertainty, work environment factors and individual differences may impact the information needs of senior marketing decision-makers. In this study, a cross-sectional survey investigates a model of MkIS design defined in terms of the perceived usefulness of broad scope marketing information. Senior marketing decision-makers from 194 organisations completed a mail questionnaire on factors affecting their need for marketing information broad in scope. The preliminary results from a Partial least Squares analysis of the data identify significant relationships between contextual factors and the perceived usefulness of a broad scope MkIS.

Keywords: MkIS design, Partial Least Squares, Information Needs

**Track: Marketing Strategy and Management**

**INTRODUCTION**

The function of an information system at any level in the organisation is to provide information to enhance the decision-making process (Jones and McCleod 1986). Since a primary objective of a marketing information system (MkIS) is to provide information that facilitates the marketing management decision-making process, the information content of that system must be linked closely to this process. Ashill and Jobber (1999 2001) suggest that the information needs for marketing management decision-making can be considered in terms of general information characteristics. These information requirements are the user specifications of information characteristics involved in information seeking, and refer to those qualities of information perceived by marketing decision-makers to be useful to facilitate their decision-making. The purpose of this paper is to examine the factors that determine the need for a broad scope MkIS. Marketing information broad in scope has been identified as an information characteristic of particular significance in assisting marketing management decision-making (Ashill and Jobber 2001). Information scope represents the scope of events, places, people, and things that are represented by information (Senn, 1987). A broad scope MkIS thus describes information that is wide or broad in its representation. We begin by briefly discussing the research model reported by Ashill and Jobber (1999). We follow this with a

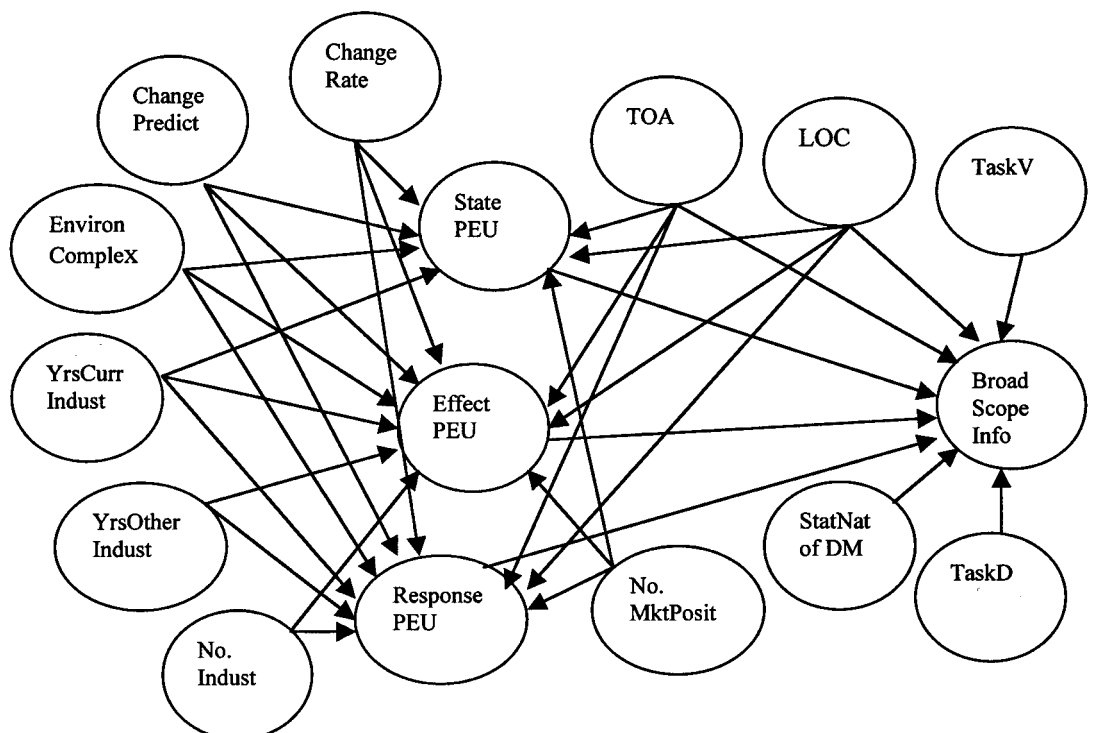
description of the cross-sectional survey that was used to collect data and the results from a Partial Least Squares analysis of the research model. In the final section, we acknowledge the implications of the research study.

**THE RESEARCH MODEL**

The propositions advanced by Ashill and Jobber (1999 2001) posit that a broad scope MkIS should be aligned to a range of contextual factors. These include external environment factors (change rate and predictability of change in the external environment, and environmental complexity), environmental uncertainty perceptions (state, effect and response), decision-maker characteristics (experience, tolerance of ambiguity and locus of control) and work environment factors (strategic nature of marketing management decision-making, task difficulty and task variability). Figure 1 represents the resulting research model. The paths in this research model have been justified elsewhere (Ashill and Jobber 1999).

External environment characteristics, environmental uncertainty perceptions, individual differences and work environment factors are represented with fifteen constructs. Characteristics of the external marketing environment are operationalised with the three constructs of change rate, predictability of change and environmental complexity. Following the work of Milliken (1987), environmental

**FIGURE 1 RESEARCH MODEL FOR A BROAD SCOPE MKIS**



uncertainty is operationalised with three constructs, namely perceived state, effect and response uncertainty. Individual differences are operationalised with six constructs: locus of control, tolerance of ambiguity, duration of experience (years of experience in the industry and years of experience in other industries), and variety of experience (number of marketing positions held and number of industries worked in). Finally, work environment is operationalised with three constructs: strategic nature of marketing management decision-making, task variability and task difficulty. Measures for the endogenous construct broad scope information are derived from existing MkIS literature and an exploratory research phase undertaken with a sample of senior marketing decision-makers. All of these constructs are defined and operationalised elsewhere (Ashill and Jobber 1999 2001).

#### RESEARCH METHOD

The research model has sixteen constructs. Excluding the four experience measures, which are each, measured with 1 item, the remaining twelve constructs are complex concepts and are measured with multiple items. In the questionnaire design phase, we confronted the decision to model indicators as reflective or formative. The designation of reflective or formative rests on the theoretical underpinnings of a construct (Chin 1998). Well-understood constructs, which have measurement scales that reflect the underlying construct, are modeled as reflective. In this study, all constructs with the exception of perceived environmental complexity and broad scope marketing information are reflective constructs since the items reflect the meaning of the construct. Perceived Environmental Complexity and broad scope marketing information are viewed as a composite of observables and are modeled as formative (Bollen 1984).

#### Analytical Methodology

The research model was tested using Partial Least Squares (PLS), a structural modeling technique that is well suited for highly complex predictive models. For this study, the PLS methodology is considered to be appropriate for the following reasons. Two of the model constructs, namely perceived environmental complexity and broad scope marketing information, are measured with formative indicators. Being emergent constructs, they cannot be easily modeled using LISREL and other covariance-based approaches since these approaches implicitly assume all indicators to be

reflective. Also, the model of a broad scope MkIS proposed and tested in this study is quite complex - involving seventy-four measures of the sixteen main constructs. PLS provides advantage over LISREL especially in the early stages of theory development and testing, and in dealing with complex models (Fornell and Bookstein 1982).

#### DATA ANALYSIS

A survey questionnaire was mailed to 560 Senior Marketing Decision-Makers working in diverse manufacturing and services businesses and consumer and industrial product businesses. Two hundred and four respondents returned the questionnaire. Ten cases were deleted from the sample because of problems with excessive missing data with three of the dependent variables (Hair et al 1998). Frequency analysis of the seventy-four items indicated no problems of floor or ceiling effects in the measurements.

#### Evaluation of the Measurement (Outer) Model

The test of the measurement model includes the estimation of the internal consistency and the convergent and discriminant validity of the instrument items. Formative items however are treated differently. All measures of the perceived environmental complexity construct and the broad scope marketing information construct (significant and non-significant) are retained for the PLS modeling. The reason being that unlike the reflective measures, whose reliability and validity can be assessed by examining the loadings, cross-loadings, and internal consistency, the reliability of formative measures cannot be examined before using the measures in PLS modeling (Chin 1998). For reflective indicators, all reliability measures are above the recommended level of 0.70, thus indicating adequate internal consistency (Nunnally 1978). Measures are also considered to have adequate discriminant validity if the square root of the AVE for each construct is larger than the correlation between the construct and any other construct in the model. All constructs in the estimated model fulfill this condition. Convergent validity is demonstrated when items load highly (loading >0.50) on their associated factors. Individual reflective measures are considered to be reliable if they correlate more than .7 with the construct they intend to measure. In the early stages of scale development, loading of 0.5 or 0.6 is considered acceptable if there are additional indicators in the block for comparative purposes (Chin 1998). In this study, 18 of the reflective measures have loadings above 0.70 on their respective constructs, 12 have loadings between 0.6 and 0.7, 7 have loadings between 0.5 and 0.6

and 16 measures have loadings below the acceptable level of 0.5. Three items below the 0.5 threshold measuring the locus of control construct are retained, since this construct is measured with seven other measures that have acceptable loadings, and the three measures do not have a higher loading on any other construct in the model. One item is also retained for the Tolerance of Ambiguity construct for the same reason. All other items with loadings  $<0.5$  are dropped from their associated factors. Three items associated with the task difficulty construct (measured with 6 items) have strong loadings linking them closely with the construct, but the remaining three items have loadings, which are closer to zero. Hulland (1998) suggests that in such instances, the researcher should consider either splitting the original construct into new constructs (each with its own set of measures) or eliminating items until only a unidimensional construct remains. In this study, the task difficulty construct appears to be multidimensional as suggested by the uneven loadings and is split into two distinct sub-constructs - task analyzability (3 items) and task predictability (3 items).

#### **Evaluation of the Structural (Inner) Model**

Consistent with the distribution free, predictive approach of PLS, the structural model is evaluated using the R-square for the dependent constructs and the size, t-statistics and significance level of the structural path coefficients. The t-statistics are estimated using the bootstrap reampling procedure (100 resamples). The significant results of the structural model are summarized in Table 1. The results show that the model explains 30.7% of the variance in the broad scope marketing information construct, 38.5% of the variance in state environmental uncertainty, 30.9% of the variance in effect environmental uncertainty and 19.2% of the variance in response environmental uncertainty. Thus, overall, the model explains a large proportion of variance in the broad scope marketing information, state uncertainty and effect uncertainty constructs, and an acceptable proportion of variance in the response uncertainty construct (indicating that variables other than environmental characteristics and individual differences are at work to affect perceived response uncertainty).

#### **Findings and Discussion**

Sixteen of the thirty-four relationships examined are statistically significant and one is in the opposite direction to that hypothesised. These results show that senior marketing decision-

makers who function in external marketing environments where change is less predictable perceive more uncertainty about the state of the marketing environment (state uncertainty), the future state of events on the organisation (effect uncertainty) and higher uncertainty as to the likely consequences of a response choice (response uncertainty). Change rate however, is not a significant contributor to effect and response uncertainty perceptions. The findings also suggest that perceived environmental complexity is a significant contributor to the three environmental uncertainty conditions. Complex marketing environments characterise a large number of environmental factors in decision-making which are more difficult to manage.

The research model reported by Ashill and Jobber (1999) also posits that decision-makers with greater experience (duration and variety) perceive the external environment as less uncertain than decision-makers with lower levels of experience. Variety (measured by the number of marketing positions held) is positively associated with perceptions of state environmental uncertainty and duration of experience (years of experience in the current industry) is positively associated with perceptions of response uncertainty. The findings also show a positive relationship between locus of control and perceptions of state, effect and response uncertainty. This findings support empirical work in the information systems literature suggesting that internals are 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.

As predicted, the impact of task predictability, locus of control and the strategic nature of marketing management decision-making on the perceived usefulness of a broad scope MkIS are all statistically significant, although some are weak. Specifically, the need for a broad scope MkIS is higher when marketing decision-makers cannot predict the outcome of their marketing management work (greater task unpredictability). The impact of locus of control is also significant suggesting that internals are more apt to recognise the relevance of information for their purposes, and have a greater tendency to gather information in marketing decision-making. Finally, the strategic nature of decision-making is a contributor to the scope of information needed in a MkIS suggesting that marketing decisions, which are more strategic in nature, are more likely to demand information that is wide or broad in its representation.

TABLE 1 STRUCTURAL (INNER) MODEL RESULTS

	Proposed Effect	Path Coefficient	Observed t-value	Sig. Level*	1-tail/2-tail
<b>Effects on Perceived State Environmental Uncertainty (R-square = 0.385)</b>					
Change Rate	+	+0.080	+1.5068	*	1
Unpredictability of Environmental Change	+	+0.492	+7.7840	****	1
Environmental Complexity	+	+0.145	+2.1988	**	1
Locus of Control	+	+0.145	+2.3981	***	1
Number of Marketing Positions Held	-	-0.075	-1.5011	*	1
<b>Effects on Perceived Effect Environmental Uncertainty (R-square = 0.309)</b>					
Change Rate	+	+0.086	+1.4239	*	1
Unpredictability of Environmental Change	+	+0.452	+7.7252	****	1
Locus of Control	+	+0.130	+2.0242	***	1
<b>Effects on Perceived Response Environmental Uncertainty (R-square = 0.192)</b>					
Unpredictability of Environmental Change	+	+0.241	+3.2547	****	1
Environmental Complexity	+	+0.107	+1.2840	*	1
Locus of Control	+	+0.0920	+1.5439	*	1
Experience in Current Industry	-	-0.206	-3.2326	***	1
<b>Effects on Broad Scope Information (R-square = 0.307)</b>					
Effect PEU	+	-0.317	-2.8339	(***)	1
Locus of Control	-	-0.216	-1.5767	*	1
Strategic Nature of Marketing Decision-Making	+	+0.233	+2.0001	**	1
Task Unpredictability	+	+0.223	+1.4475	*	1

\* p-values: \*\*\*\* - <0.001, \*\*\* - <0.010, \*\* - <0.050, \* - <0.100

Contrary to expectations, perceptions of effect environmental uncertainty (an inability to understand the impact of events on the organisation and marketing decision-making) has a significant negative effect on the perceived usefulness of a broad scope MkIS to facilitate marketing management decision-making. This suggests that under conditions of higher environmental uncertainty, senior marketing decision-makers perceive a broad scope MkIS to be less useful to facilitate their decision-making.

One explanation for this is that under conditions of higher effect environmental uncertainty, senior marketing decision-makers become more inward looking, resulting in the need for marketing information more narrow in scope to facilitate marketing decision-making.

#### IMPLICATIONS

There have been few empirical studies examining factors, which affect the information needs of marketing decision-makers. A valuable

contribution of this study is the extension of the MkIS literature through the investigation of factors that determine the scope of information needed in a MkIS. The preceding analysis provides significant insights into the relationships between marketing environment characteristics, perceived environmental uncertainty perceptions, individual differences, work environment factors and a broad scope MkIS, and offers a complete test of the hypothesis advanced by Ashill and Jobber (1999). The findings have implications for future research and the design of a MkIS. In terms of research, the results indicate that situational approaches are useful in studying and understanding marketing information needs. Effect uncertainty, decision-maker locus of control, strategic nature of decision-making and task predictability have significant influence on the need for a broad scope MkIS to facilitate marketing decision-making. Designers of a MkIS need to be conscious of the effects of these factors when designing a MkIS. These factors determine the scope of information needed in a MkIS. The study therefore makes some contribution to improve our understanding of the determinants of MkIS design.

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