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Strategy, perceived environmental uncertainty, management accounting systems and performance: An empirical investigation

Kar Ming Chong

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STRATEGY, PERCEIVED ENVIRONMENTAL UNCERTAINTY, MANAGEMENT ACCOUNTING SYSTEMS AND PERFORMANCE: AN EMPIRICAL INVESTIGATION

by

KAR MING CHONG

A Thesis Submitted in Partial Fulfilment of the Requirements for the Award of Bachelor of Business with Honours

at the Faculty of Business,
Edith Cowan University

Date of Submission: 8th December 1995
USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.
ABSTRACT

This thesis is an empirical examination of the role of strategic business unit (SBU) strategy and perceived environmental uncertainty (PEU) on the relations between management accounting systems (MAS) design and SBU performance.

Two extreme strategic postures of Miles and Snow's typology were used in this study. They were prospector and defender. MAS design was defined in terms of the extent to which managers' use of broad scope MAS information characteristics for decision making.

A survey research methodology was used in this study. The responses of 62 SBU managers, drawn from a cross-section of manufacturing companies in Western Australia, were used in the data analysis. The companies included in the sample were randomly selected from a list of manufacturing companies published in Kompass Australia (1994/95).

A path analytic technique was used to test the hypotheses developed in this thesis. The results indicated that under high (low) PEU, the use of broad (narrow) scope MAS information by managers operating in firms pursuing prospector (defender)-type strategy led to effective decisions, thus contributing to improved SBU performance.
DECLARATION

"I certify that this thesis does not incorporate, without acknowledgment, any material previously submitted for a degree or diploma in any institution of higher education and that, to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text".

Signature

Date: 8th December 1995
ACKNOWLEDGMENTS

This thesis, in its present form, is the result of the contributions by the university’s supportive staff members. In particular, I would like to thank:

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CHAPTER 1

Introduction

Motivation for the Study

Numerous studies have examined the relationships between contingent variables (e.g., structure, perceived environmental uncertainty and strategy) and management accounting systems (MAS) design on performance (Hayes, 1977; Gul, 1991; Mia, 1993; Gul & Chia, 1994; Mia & Chenhall, 1994; Abernethy & Guthrie, 1994). Results of these studies suggest that a “fit” between the contingent variables and the design of MAS leads to improved performance.

An understanding of the impact of strategic choices on management control systems design has been argued as a research imperative (Otley, 1980; Govindarajan & Gupta, 1985; Dent, 1990; Simons, 1987; 1990). Simons (1987, p. 357), for example, argued “the potential importance of understanding the relationship between strategy and accounting control systems as a prerequisite to the development of general theories concerning accounting control systems in complex organisations”. However, he observed that an understanding of the control systems choice in firms pursuing different strategies from an accounting perspective has been limited. Simons’s argument is supported by Govindarajan & Gupta (1985, p. 51) who argued that “empirical investigations on linkages between strategy and control systems have tended to be very sparse”.

In addition, research on the influence of strategy on the role of accounting information and performance appears to be equivocal. Simons (1987), for example, found that a firm pursuing a prospector-type strategy tended to emphasise more on accounting information.
relative to a firm pursuing a defender-type strategy. Specifically, he found that a prospector-type business unit tended to attach a great deal of importance to forecasting data, setting tight budget goals, monitoring outputs carefully and emphasising frequent reporting. In contrast, Govindarajan (1988) found a low emphasis or reliance on financial information in business units pursuing a prospector-type (differentiation) strategy. He concluded that financial controls such as budget-based evaluation systems might be more appropriate for business units adopting a defender-type (low-cost) strategy. The inconsistent results and lack of understanding of the impact of strategic choice on the role of accounting information, lead to the first motivation of this study.

Prior studies (e.g., Miles & Snow, 1978; Govindarajan, 1988; Gul, 1991; Mia, 1993; Gul & Chia, 1994; Mia & Chenhall, 1994) have suffered from fragmentary and incomplete research frameworks. Miles and Snow (1978), for example, acknowledged the importance of the association between the type of strategy pursued by a firm and the environment, but they failed to empirically examine the role of accounting information and performance. Govindarajan (1988), on the other hand, investigated the impact of strategy and one aspect of accounting control systems on performance, but failed to examine the impact of the environment and the role of accounting information in his study. Other studies (e.g., Gul, 1991; Mia, 1993; Gul & Chia, 1994; Mia & Chenhall, 1994) have provided strong empirical evidence to support the influence of perceived environmental uncertainty (PEU) and MAS design on performance, but they failed to consider the impact of strategy. Moreover, Otley (1980, p. 94) argued that in assessing organisational performance, it is important to determine the performance, in part, "by the objectives of the organization [strategy] itself rather than by externally imposed standard". Given the importance of the association between strategy and PEU, there has been a surprising lack of empirical investigation on the effects of these two variables on the relation between the role of accounting information and performance. The conflicting results of prior studies may be attributed to the lack of a coherent research framework which integrates environment, strategy, MAS information
characteristics and performance. To date, no study has examined jointly the impact of PEU and strategy on MAS design and performance. Given the existing limitations of prior research work on the area of MAS design, this study is motivated by the need to develop an integrated research framework to examine the role of strategy and PEU on MAS design and performance.

Chapter Outline and Organisation

The thesis is organised as follows: Chapter 2 provides a review of the relevant literature on contingency theory in MAS research. The relevance of the conclusions from the results of theoretical and empirical studies are identified.

Chapter 3 discusses the concept of SBU strategy, PEU and MAS. This is followed by the theoretical discussions that lead to hypotheses formulation. A proposed empirical model is also presented in this chapter.

Chapter 4 presents the research method used in this study. The sample selection and measurement instruments are explained and justified.

Chapter 5 presents and discusses the results of the data analysis. The results on descriptive statistics, test of instruments' reliability and validity, correlation matrix and regressions to test the hypotheses proposed in Chapter 3 are presented in this chapter.

Chapter 6 concludes with a summary of the major findings and the implications of the results. Limitations of the research and further research avenues are also discussed.
CHAPTER 2

Literature Review

Introduction

The contingency approach in management accounting systems (MAS) research has come to replace the earlier universal approach. The universal approach is based on the premise that a universally appropriate accounting system exists, independent of unique organisational circumstances. Otley (1980, p. 413) suggested that:

the contingency theory is based on the premise that there is no universally appropriate accounting system which applies equally to all organisations in all circumstances. Rather, it suggests that particular features of an appropriate accounting system will depend upon the specific circumstances in which an organisation finds itself.

Contingency theory has its beginning in the management literature, particularly in organisation theory. An organisation was initially viewed as existing in a closed system where it was independent of its environment. Studies in scientific management (e.g., Taylor, 1967) provided the impetus for the application of universal approach in organisational design. Challenges to the universal approach began in the 1960s. Researchers began to adopt an open system perspective of an organisation where it was viewed as a set of interdependent parts which formed a system. This system, in turn, would interact with the environment. The interactive nature of the parts within the organisation, and between the organisation and the environment give rise to the central idea of contingency theory. Early
Contingency researchers (e.g., Burns & Stalker, 1961; Woodward, 1965; Lawrence & Lorsch, 1967) were interested in organisational structures and the external environments in which the organisations operated. Contextual variables (e.g., external environment) were suggested to have an influence on production technology (Woodward, 1965), and the organisations' structural flexibility along a mechanistic-organic continuum (Burns & Stalker, 1961). By the middle of the 1970s, the application of contingency theory to the analysis and design of management control systems was recognised as dominant in the field of organisation theory.

Contingency Theory in MAS Research

Hayes (1977) proposed three major contingencies that were likely to affect managers' evaluation of subunits' effectiveness. His research framework is shown in Figure 1. Hayes found that environment and interdependency played important roles in determining the effectiveness of marketing and research and development subunits. Production subunits relied more on internal factors as measures of effectiveness. Hayes's study implied that a sole use of financial accounting information to measure the effectiveness of different subunits was inadequate. Performance evaluation criteria should include non-financial measures to evaluate subunits that were affected by contingencies such as environment and subunits interdependency.
Waterhouse and Tiessen (1978) proposed two contextual variables (technology and environment) in developing a conceptual model for the comparative analysis of organisations. They argued that an organisation's structure is influenced by these variables. The structure, in turn, affects the design of an organisational control system where MAS is part of the control system. Waterhouse and Tiessen's model, therefore, implies that the design of MAS follows the organisation's structural decisions. The comparative model allowed organisational effectiveness to be explained by linking the context of organisations to the structural properties of the organisation and finally to the efficiency of MAS. Environment was conceptualised in terms of predictability. Technology was conceptualised...
in terms of the routineness of the conversion processes for the organisation's raw material (Perrow, 1967). The unit of analysis was organisational sub-units. While acknowledging the importance of examining the relationships between properties of organisations and the technology of MAS design and implementation, Waterhouse and Tiessen (p. 74) noted that "the general thrust of the contingency approach to the study of organisations . . . suggest that organizational and MAS design variables are closely linked".

Otley (1980) provided a critical assessment of the contingency theory in management accounting by reviewing previous empirical and theoretical research. He argued that the contingency approach has the potential to develop the theory of management accounting. However, the development may be hampered by current research that lacked conceptual clarity and utilised inadequate and insufficiently articulated model. Most empirical studies have tested a simple linear contingency model (see Figure 2) with the design of MAS influenced by organisational design which, in turn, was dependent on contextual variables.
In contrast to Waterhouse and Tiessen's (1978) comparative model, Otley argued that the decisions on structural and information systems design could be taken independently or simultaneously as complementary strategies. He suggested a more comprehensive framework, which examined accounting information systems in a wider control perspective. Organisational effectiveness should also be taken into consideration as it is the outcome of the association between MAS and certain contingent variables. The inclusion of organisational effectiveness requires strategy to be one of the contingent variables because organisational effectiveness is measured in relation to strategy. Overall, he proposed a more holistic approach in conceptualising and empirically testing of control systems where an organisational control package included an accounting system, management information...
system, organisation design, reward and incentive system, and other control arrangements.

Otley's comprehensive model is shown in Figure 3.

![Contingency Model](image)

**Figure 3.** A comprehensive contingency model for AIS design


Gordon and Narayanan (1984) examined the relationships between an organisation’s environment, structure and information system. Perceived environmental uncertainty (PEU) refers to a manager's perception of the organisation's external environment while organisation structure was conceptualised on a mechanistic-organic continuum. Management accounting system (MAS) was operationalised in terms of the perceived importance of three information characteristics, namely, external, non-financial and ex-ante. Gordon and Narayanan found that a firm's information system and structure were both a function of environment. More importantly, further analysis showed that there was no significant relationship between structure and information system, after controlling for environment.
Chenhall and Morris (1986) partially replicated and extended Gordon and Narayanan's (1984) study by including unit interdependence and expanding MAS information characteristics to include timeliness, level of aggregation and level of integration. Their research framework is shown in Figure 4.

**Figure 4. Chenhall and Morris's research framework**


Timeliness refers to the speed and frequency of information while aggregation focuses on the summation of information for formal decision models (e.g., discounted cash flow analysis, linear programming in budgetary applications). Integration refers to information that enables control and coordination of various segments within a sub-unit. PEU was defined in terms of a manager's decision making environment and structure was measured in terms of decentralisation. Unit interdependence refers to the exchange of output that takes place between segments within a sub-unit. Chenhall and Morris found that PEU was associated with broad scope and timeliness information. Further analysis indicated that the effects of PEU and organisational interdependence were, in part, indirect through their association with decentralisation.
Gul (1991) examined the interactive effect of PEU and MAS information on small business managers' performance. He found that PEU interacted with the availability of sophisticated MAS information to affect performance. Specifically, he found that under the condition of high PEU, sophisticated MAS information had a positive effect on performance. On the other hand, under the condition of low PEU, providing managers with sophisticated MAS information may be dysfunctional and hamper their performance.

Mia (1993) examined the role of MAS information in improving managerial performance and job satisfaction. Using a path analysis, he found that broad scope MAS information acted as a mediator in the relationship between managers' PEU and their performance. Specifically, he found that as managers' PEU increased, the use of broad scope MAS information led to an improvement in their performance. However, he found that the relationship between PEU and job satisfaction was direct and inverse, thus suggesting that MAS information did not act as a mediator in this relationship. Mia's research framework is shown in Figure 5.

![Figure 5. Mia's research framework](image)

Figure 5. Mia's research framework

Gul and Chia (1994) investigated the three-way interactions of PEU, decentralisation (structure) and the availability of MAS information characteristics in terms of scope and aggregation on managerial performance. Drawing on the responses of Singaporean managers, Gul and Chia found that decentralisation and the availability of MAS information in terms of scope and aggregation were associated with higher managerial performance under high levels of PEU. Under low levels of PEU, decentralisation and the availability of MAS information in terms of scope and aggregation were associated with lower managerial performance.

Mia and Chenhall (1994) examined the role of functional differentiation and broad scope MAS information on managerial performance. They (p. 1) proposed that “differentiation of activities into areas such as marketing and production is an organisation’s response to manage uncertainty”. They argued that, as a result of organisational buffering, marketing managers faced relatively higher levels of task uncertainty than production managers. The results appeared to support their hypothesis that the extent of use of broad scope MAS information and performance was stronger for marketing managers than production managers. Marketing managers required a broader scope of MAS information for decision making to cope with uncertainty.

Govindarajan and Gupta (1985) tested the linkages between the systematic differences in management control systems among firms pursuing different strategies with performance at strategic business unit (SBU) level. They concentrated on bonus remuneration, one aspect of management control and developed a strategic typology based on the variations in strategic mission at the business level, i.e., harvest versus build strategies. A build strategy focused on tasks with long-term implications, for example, searching for new markets and creating innovative products. The results indicated that long-run and subjective measures of bonus remuneration were related with build strategy and had a positive effect on performance at strategic business level.
Govindarajan (1988) integrated previous research by investigating the associations between three key administrative mechanisms and competitive strategies implemented at SBU level. The three administrative mechanisms are organisational structure, control systems and managers' locus of control. Bivariate analyses suggested that a low emphasis in financial information in units adopting innovative strategies was associated with better performance. Multivariate analyses indicated that when the three administrative mechanisms were aligned appropriately to meet the requirements of SBU strategy, superior performance occurred.

Simons (1987) found that there were differences in the control systems of firms pursuing different strategies. His ten control system attributes were: (1) tightness of budget goals, (2) external scanning, (3) results monitoring, (4) cost control, (5) forecast data, (6) goals related to output effectiveness, (7) reporting frequency, (8) formula-based bonus remuneration, (9) tailored control systems and (10) control system changeability. His results suggested that innovative SBUs (prospector) which have rapid product development, used a high degree of forecast data in control reports, set tight budget goals, monitored outputs carefully, reported frequently and used uniform control systems that were modified frequently. This led Simons to conclude that prospector-type SBUs emphasised more on the use of financial accounting information relative to SBUs which have stable product markets (defender-type).

Abernethy and Guthrie (1994) investigated the relationship between SBU strategy, management information system (MIS) and SBU performance. Abernethy and Guthrie's research framework is shown in Figure 6. MIS was operationalised in terms of Chenhall and Morris' (1986) broad scope information attributes (i.e., non-financial, external & futuristic). Consistent with prior studies (e.g., Simons, 1987) and adopting Miles and Snow's (1978) strategic typology (prospector and defender type), they found that the use of broad scope MAS information by managers operating in SBUs adopting a prospector-type strategy was
related to high performance. The results suggested that managers operating in SBU that pursued continuous product/market development and innovation (prospector-type strategy) required broad scope MAS information to monitor a wide range of environmental conditions and events.

![Diagram showing MIS Design, SBU Strategy, and SBU Performance]

**Figure 6.** Abernethy and Guthrie's research framework


A summary of the major studies in contingency theory in MAS research from 1975 to 1994 is presented in Table 1.

**Conclusions**

The literature review has traced the development of contingency research in management accounting from 1975 to 1994. The review indicates that management accounting research based on contingency theory seemed to be composed of two areas. The first area of research focused on environment and structure as contingent variables (e.g., Hayes, 1977; Waterhouse & Tiessen, 1978; Gordon & Narayanan, 1984; Chenhall & Morris, 1986; Gul,
MAS was operationalised in terms of certain information characteristics such as external, non-financial and futuristic information. These information characteristics have been identified as important supplements to traditional MAS information (i.e., financial, historical & internal). With the exception of Hayes' (1977) study, early studies (e.g., Gordon & Narayanan, 1984; Chenhall & Morris, 1986) did not examine the resultant impact of contingent variables and MAS on performance. However, recent studies (Gul, 1991; Mia, 1993; Mia & Chenhall, 1994) have begun to incorporate performance into their models. Thus far, this area of research shows consistent and strong support for the linkages between PEU, MAS and performance. However, the impact of strategy on MAS design has been ignored.

The second area of research has attempted to address the question of systematic differences in management control systems among firms adopting different strategies (e.g., Miles & Snow, 1978; Govindarajan & Gupta, 1985; Govindarajan, 1988; Simons, 1987; 1990; Dent, 1990; Abernethy & Guthrie, 1994). Most of these research have focused on particular attributes of the control systems especially with financial control practices. The financial controls were assumed to possess narrow information characteristics (i.e., financial, internal and historical). MAS was operationalised in various aspects of accounting control systems such as types of incentive bonus schemes (Govindarajan & Gupta, 1985), budgets (Govindarajan, 1988) or dimensions of management control attributes (e.g., tightness of budget goals, monitoring of results and reporting frequency) (Simons, 1987). Future research needs a broader framework of control systems that deal with information characteristics, not typically possessed by traditional MAS. Research in this area has been sparse and results have been mixed. Simons (1987) found that innovative SBUs tended to use financial controls more aggressively than low cost product SBUs, while Govindarajan's (1988) findings suggested a low emphasis on financial information was associated with higher performance in innovative SBU levels.
The literature review indicates that the inconsistent findings and lack of understanding of the impact of strategic choices on the role of accounting information warrant further research (Otley, 1980; Govindarajan & Gupta, 1985; Dent, 1990; Simons, 1987; 1990). Furthermore, as prior studies have suffered from fragmentary and incomplete research frameworks, the need to develop an integrated research framework would provide further insights into the precise impact of strategic choices and environment on MAS design and organisational performance.
<table>
<thead>
<tr>
<th>Study</th>
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<th>Organisational design</th>
<th>Dimensions of organisational effectiveness</th>
</tr>
</thead>
<tbody>
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<td>Hayes (1977)</td>
<td>Environmental factors; Interdependency factors; internal factors</td>
<td>Appropriate performance evaluation techniques</td>
<td>Not considered</td>
<td>Departmental effectiveness</td>
</tr>
<tr>
<td>Govindarajan &amp; Gupta (1985)</td>
<td>Strategy (Build/ Harvest)</td>
<td>Style of evaluation for rewards</td>
<td>Not considered</td>
<td>SBU performance</td>
</tr>
<tr>
<td>Chenhall &amp; Morris (1986)</td>
<td>Perceived environmental uncertainty; Organisational interdependence</td>
<td>Perceived usefulness of information characteristics in terms of broad scope, timeliness, aggregation and integration</td>
<td>Structure (decentralisation)</td>
<td>Not considered</td>
</tr>
<tr>
<td>Simons (1987)</td>
<td>Strategy (Prospector/Defender)</td>
<td>Financial control systems</td>
<td>Not considered</td>
<td>Not considered</td>
</tr>
<tr>
<td>Govindarajan (1988)</td>
<td>Strategy (Differentiation/Low-cost)</td>
<td>Budget evaluative style</td>
<td>Structure</td>
<td>Managerial performance</td>
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Table 1

Major Contingency Studies in MAS Research (1975-1994) (Continued)

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<th>Study</th>
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<th>AIS/Other control arrangements</th>
<th>Organisational design</th>
<th>Dimensions of organisational effectiveness</th>
</tr>
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<td>Perceived availability of sophisticated MAS information characteristics</td>
<td>Not considered</td>
<td>Small business managers' performance</td>
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<tr>
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<td>Perceived importance of information characteristics</td>
<td>Not considered</td>
<td>Managerial performance and job satisfaction</td>
</tr>
<tr>
<td>Gul &amp; Chia (1994)</td>
<td>Perceived environmental uncertainty</td>
<td>Perceived availability of MAS information characteristics in terms of broad scope and aggregation</td>
<td>Structure (decentralisation)</td>
<td>Managerial performance</td>
</tr>
<tr>
<td>Mia &amp; Chenhall (1994)</td>
<td>Functional differentiation (Production/Marketing)</td>
<td>Availability and use of broad scope MAS information characteristic</td>
<td>Not considered</td>
<td>Managerial effectiveness</td>
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<tr>
<td>Abernethy &amp; Guthrie (1994)</td>
<td>Strategy (Prospector/Defender)</td>
<td>Perceived importance of broad scope MAS information characteristic</td>
<td>Not considered</td>
<td>SBU performance</td>
</tr>
</tbody>
</table>
CHAPTER 3

Theoretical Development and Hypotheses Formulation

Introduction

This chapter provides the theory to support the hypotheses tested in this thesis. A proposed empirical model is also presented. The majority of the chapter is devoted to development of the direct effect hypotheses, which relate to: (1) the linkage between SBU strategy and PEU, (2) the linkage between SBU strategy and broad scope MAS information, (3) the linkage between PEU and broad scope MAS information, and (4) the linkage between broad scope MAS information and SBU performance.

Other hypotheses to be tested deal with the indirect effect hypotheses, which relate to: (1) the indirect relationship between SBU strategy and SBU performance acting through broad scope MAS information, and (2) the indirect relationship between PEU and SBU performance acting through broad scope MAS information.

Before turning to the development of these hypotheses, it is necessary to define the following variables: (1) SBU strategy, (2) PEU, and (3) broad scope MAS information.

Concept of SBU Strategy

Strategy formulation and implementation have been conceptualised at three organisational levels: corporate, business unit and departmental (functional) level. Recent studies have focused on business unit level as the unit of analysis (e.g., Govindarajan &
Gupta, 1985; Govindarajan, 1986; 1988; Gupta, 1987; Abernethy & Guthrie, 1994). At the business unit level, two dimensions of strategy have been identified: mission and competitive posture. Strategic mission is concerned with the goals of an organisation on whether to emphasise market growth or maximise short-term earnings/cash flows (Govindarajan & Gupta, 1985). Strategic mission is often operationalised on the continuum from "pure build" (long term market growth) to "pure harvest" (short term profit maximisation).

This study aims to examine competitive strategy at the business unit level. Strategy researchers have identified generic competitive strategies at this level (e.g., Miles & Snow, 1978; Porter, 1980). Competitive strategy refers to ways in which an organisation competes with other firms in the industry to achieve its goals. Popular archetypes for competitive strategy are Porter's (1980) "differentiation" and "low-cost" strategy and Miles and Snow's (1978) "prospectors" and "defenders". General consensus indicates that both "differentiation" and "prospectors" strategic types aim to produce innovative and unique products. In contrast, both "low cost" and "defenders" strategic type compete in an industry by their abilities to maintain standard products and maximise internal throughput efficiencies.

This study adopts Miles and Snow's (1978) competitive strategic typology. Miles and Snow identified four generic strategic types across four different industries (college textbook publishing, electronics, food processing and health care). They classified firms into either prospectors, defenders, analysers or reactors. Prospector, defender and analyser types are viable strategies while reactor-type is a non-viable strategy. Subsequent studies confirmed this expectation (Snow & Hrebiniak, 1980; Hambrick, 1983). These generic strategies are also found to be applicable across industries (Miles & Snow, 1978; Snow & Hrebiniak, 1980). Consistent with prior accounting studies (e.g., Simons, 1987; Abernethy & Guthrie, 1994), this study chooses to examine Miles and Snow's strategic typology on two extreme
strategic postures (i.e., prospector and defender). These two generic postures have received empirical validation (Simons, 1987; Abernethy & Guthrie, 1994). The Miles and Snow's typology provides the basis to develop a theoretical framework which is useful for identifying the characteristics of information systems in different strategic contexts (Simons, 1987).

The key dimension underlying the Miles and Snow's typology is the rate at which an organisation changes its products or markets. Prospector-type firms seek to continually bring out new products to the markets. They compete through product differentiation by creating innovative products and offering a wide range of products (product breath). To create demand for their products, prospector-type firms must also scan the environment for current events and future trends. They seek new markets aggressively to look for opportunities. Due to the constant shift in the product range and offerings, a prospector must tailor its internal mechanisms effectively.

In contrast, defender-type firms compete mainly on price. The ability to offer low prices depends on the efficiencies of their internal processes. A defender-type firm continually looks for ways to cut its product costs. New product developments are rare because a defender-type firm emphasises on maintaining standard products. Therefore, it has a limited product range. Its market domain is stable and is usually focused on a particular market niche.

In order for an organisation to align itself with its environment and perform effectively, there should be an appropriate "fit" between its entrepreneurial, engineering and administrative solutions. Entrepreneurial solutions refer to the choice of a product-market domain while engineering solutions involve the selection of a production and distribution technology that are appropriate to the selected domain. Administrative solutions deal
with an organisation's structure and control systems. A summary of the three major organisational problems and solutions is provided in Table 2.

Table 2
Characteristics of Prospector and Defender-type Firms

<table>
<thead>
<tr>
<th>Prospectors</th>
<th>Defenders</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Entrepreneurial:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Problem</strong></td>
<td>How to locate and exploit new product and market opportunities?</td>
</tr>
<tr>
<td><strong>Solutions</strong></td>
<td>1) Broad and continuously developing domain</td>
</tr>
<tr>
<td></td>
<td>2) Monitors wide range of environmental conditions and events</td>
</tr>
<tr>
<td></td>
<td>3) Creates change in the industry</td>
</tr>
<tr>
<td></td>
<td>4) Growth through product and market development</td>
</tr>
<tr>
<td></td>
<td>5) Growth may occur in spurts</td>
</tr>
<tr>
<td><strong>Engineering:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Problem</strong></td>
<td>How to avoid long term commitment to mass production of a single product?</td>
</tr>
<tr>
<td><strong>Solutions</strong></td>
<td>1) Flexible, prototypical, multiple and people-oriented technologies</td>
</tr>
<tr>
<td></td>
<td>2) Low degree of routinisation and mechanisation</td>
</tr>
<tr>
<td>Administrative:</td>
<td>Prospects</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td><strong>Problem</strong></td>
<td>How to facilitate co-ordination and control of numerous and diverse operations?</td>
</tr>
<tr>
<td><strong>Solutions</strong></td>
<td>1) Marketing and research and development departments are dominant coalition</td>
</tr>
<tr>
<td></td>
<td>2) Broad planning</td>
</tr>
<tr>
<td></td>
<td>3) Low division of labour and degree of formalisation</td>
</tr>
<tr>
<td></td>
<td>4) Complex coordination mechanisms</td>
</tr>
<tr>
<td></td>
<td>5) External performance evaluation (e.g., competitors)</td>
</tr>
</tbody>
</table>


**Concept of Perceived Environmental Uncertainty (PEU)**

Environment is seen as an important variable that affects organisations. It refers to all social and physical factors, both internal and external to the organisation, that are taken directly into consideration in the decision-making behaviour of managers (Duncan, 1972; Waterhouse & Tiessen, 1978).
Initial conceptualisation of environment dimension relates to the degree of interconnectedness and the extent of change in the environment (e.g., Emery & Trist, 1965). Subsequent researchers began to distinguish between rate of environmental change and degree of uncertainty (e.g., Thompson, 1967; Duncan, 1972). A high rate of environmental change does not necessarily imply a high level of uncertainty as an organisation may know reasonably well what environmental conditions it will face in the future. The degree of uncertainty in the environment refers to the heterogeneity and unpredictable change in the environment. For example, Duncan (1972) classified environment dimensions into two typologies of simple/complex type and static/dynamic type. He found that simple-static environments faced lesser perceived uncertainty compared to the complex-dynamic environments.

The notion of environmental uncertainty in this study relates not to objective conditions but to the perceptions of members in an organisation. An organisation's objective environment is typically more complex than perceived environment because individuals do not have the processing capabilities to assess all the environmental cues. Weick (1969) argued that organisation members respond to enacted environment rather than to the objective environment. According to Miles, Snow and Pfeffer (1974, p. 249), "the organisation responds only to what it perceives; those things that are not noticed do not affect the organisation's decisions and actions". Hence, different organisations may react differently in the same "objective" environment. The importance of individual perception in defining environmental characteristics is further supported by Duncan (1972, p. 325) who suggested that environmental characteristics are "dependent on the perceptions of organizational members and thus can vary in their incidence to the extent that individuals differ in their perceptions".

PEU is broadly characterised by a lack of understanding of cause and effect relationships in the environment (Thompson, 1967; Lawrence & Lorsch, 1967). As a result, PEU can create
uncertainty in managers’ decision making processes and consequently, the decision effectiveness of managers may be affected due to incomplete knowledge or lack of information. Since this study is concerned with the information needs of managers at strategic business level, only the decision environment at the organisation (macro)-level is relevant.

This study operationalised PEU in terms of the managers' perceptions of their organisational's stability and complexity of the external environment. An organisational's external environment include market, economic and technological changes and customer' preferences (Gordon & Narayanan, 1984).

**Concept of Broad Scope Management Accounting System (MAS) Information**

MAS is part of an organisation's planning and control system (Otley, 1980). The role of MAS is to provide relevant and timely information to managers for decision making which will facilitate the coordination of different activities and enable the organisation to achieve its overall objectives.

MAS is traditionally viewed as providing financial information which is historical in nature (Hayes, 1977). Researchers have pointed out the need to complement traditional MAS information with a broader set of information characteristics (Gordon & Miller, 1976; Hayes, 1977; Larcker, 1981; Gordon & Narayanan, 1984; Chenhall & Morris, 1986). Furthermore, given the new global competitive environment and the need to adopt new manufacturing techniques, a broader set of information characteristics is considered critical to meet these challenges (Johnson & Kaplan, 1987).
Prior studies on the linkage between strategy and accounting control systems have tended to focus on one or a few aspects of accounting systems. For example, researchers have examined incentive bonus systems (Govindarajan & Gupta, 1985), budget evaluation systems (Govindarajan, 1984; Govindarajan, 1988), information characteristics (Chenhall & Morris, 1986; Gul & Chia, 1994; Abernethy & Guthrie, 1994) and financial control systems (Simons, 1987). Consistent with prior accounting studies (e.g., Abernethy & Guthrie, 1994; Mia & Chenhall, 1994), this study examines the breadth of scope of MAS information characteristics because of the theoretical and empirical support of the linkages between SBU strategy, PEU, broad scope MAS information and SBU performance.

Recent studies (e.g., Mia, 1993; Gul & Chia, 1994, Mia & Chenhall, 1994; Abernethy & Guthrie, 1994; Chong, in press) have identified broad scope MAS information characteristic as having significance in assisting managerial decisions. The scope of MAS information refers to the dimensions of focus, quantification and time horizon. MAS information is conceptualised in this study along the continuum of narrow and broad scope information. Narrow scope MAS information provides information relating to events within the organisation and is historical and monetary in nature. In contrast, broad scope MAS information refers to information that focuses on external events, which may be economic or non-economic, futuristic and non-financial measurements. Other information characteristics include timeliness, levels of aggregation and levels of integration (Chenhall & Morris, 1986). A summary of the MAS information characteristics is presented in Table 3.
Table 3

MAS Information Characteristics

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>• External information</td>
</tr>
<tr>
<td></td>
<td>• Nonfinancial information</td>
</tr>
<tr>
<td></td>
<td>• Future-oriented (e.g., probabilistic)</td>
</tr>
<tr>
<td>Timeliness</td>
<td>• Frequency of reporting</td>
</tr>
<tr>
<td></td>
<td>• Speed of reporting</td>
</tr>
<tr>
<td>Aggregation</td>
<td>• Aggregated by time period</td>
</tr>
<tr>
<td></td>
<td>• Aggregated by functional area</td>
</tr>
<tr>
<td></td>
<td>• Analytical or decision models (e.g., marginal analysis, DCF, inventory models)</td>
</tr>
<tr>
<td>Integration</td>
<td>• Precise targets for activities and their interrelationships within sub-unit</td>
</tr>
<tr>
<td></td>
<td>• Reporting on intra-sub-unit interactions</td>
</tr>
</tbody>
</table>


The Relationship Between SBU Strategy and PEU

This study considers strategy implementation. The strategy implementation model is based on the argument that the strategy implemented by a unit determines to a large extent the environment with which the unit must cope (Child, 1972; Miles & Snow, 1978; Govindarajan, 1986; 1988).

In Miles and Snow's (1978) strategic typology, a prospector-type firm emphasises product innovation and product breadth. It concerns the continual search for product and market opportunities. Biggadike (1979) argued that the prospector strategy is more risky and
uncertain because the SBU is betting on products and markets that have not yet crystallised. New products create reactions from competitors and customers. Competitors may respond by bringing out another new product which, in turn, will bring about greater environmental uncertainty. Innovative products are risky because the products or markets are untested, thus, a prospector-type firm is unable to gauge customer demands and reactions. In addition, new production technology is usually needed to make these new products. New connections are also made with suppliers and distributors. All these factors contributed to greater environment complexity which results in environmental uncertainty (Thompson, 1967). This idea is supported by Govindarajan (1986, p. 847) who suggested that "the greater the external conflict and dependencies facing an organisation, the greater the uncertainty confronted by it".

A defender-type firm, on the other hand, has a narrow but stable product range. It focuses on a particular market domain and tends to ignore developments outside its own domain. It devotes primary attention to improving the efficiency of its existing operations and has expertise in product and market activities because of limited area of operations. All these factors create a relatively stable environment for the defender-type firm with low levels of PEU (Miles & Snow, 1978; Miller, 1988).

Based on the argument, the following hypothesis is tested:

$H_1$: There is a direct relationship between SBU strategy and PEU
The Relationship Between SBU Strategy and Broad Scope MAS Information

Miles and Snow (1978) observed that a strategic choice should be complemented with appropriate administrative mechanisms to support its implementation. An appropriate “fit” is critical to strategy implementation if an organisation is to perform successfully.

Khandwalla (1972) suggested that different types of competition such as price or product competition may have different impacts on the use of controls in manufacturing organisations. Based on the results of correlation between 10 control items and the type of competition, Khandwalla found that product competition was associated with greater use of sophisticated management controls relative to price competition. He argued that product competition emphasised more on accounting information because it tended to create a rather complex organisational form. Sophisticated controls were seen as powerful devices to integrate and coordinate diverse activities in the complex organisation.

Firms pursuing a prospector-type strategy locate and exploit product and market opportunity through monitoring a wide range of environmental conditions and events. A prospector competes by continually searching for new products. Therefore, it must monitor outside the domain of own market. After introducing the new product to market, it must monitor customers' reactions to the product. Emphasis on market growth and product acceptance will result in information that are not easily quantifiable and caters for long-term criteria such as market development, new product development, R & D and personnel development (Govindarajan & Gupta, 1985). These long-term criteria are “less clearly amenable to objective measurement than is performance along most short term criteria” (Govindarajan & Gupta, 1985, p. 54). Prospectors must also keep up with market trends and customers demand. Therefore, futuristic and external data are needed. Prospectors may
need external information from other industries to identify the latest production
technology to manufacture innovative and unique products.

Abernethy and Guthrie (1994) found that a broad scope MAS information to be important to
managers adopting a prospector type strategy while narrow scope MAS information was
found to be important to managers pursuing a defender-type strategy. Their results were
consistent with Simons's (1987) study that suggested that prospectors put more emphasis on
financial control systems relative to defenders.

Thus, in a prospector-type firm, where flexibility, innovation and the ability to deal with
unanticipated problems are important, it is argued that broad scope MAS information play
a vital role to enable the firm to cope with these situations.

In contrast, defender-type firms operate in a stable and narrow product market. They
emphasise on efficiency rather than innovation. The stability of their market is congruous
with a reliance on historical information. Their narrow product domain reduces the need
for extensive monitoring of the external environment conditions. Accordingly, narrow scope
MAS information would be appropriate for managers.

Based on the argument, the following hypothesis is tested:

$H_2$ : There is a direct relationship between SBU strategy and the extent to which
managers' use of broad scope MAS information for decision making
The Relationship Between PEU and Broad Scope MAS Information

Prior empirical studies have focused on the effects of PEU on the design parameter of MAS (Hayes, 1977; Gordon & Narayanan, 1984; Chenhall & Morris, 1986; Gul, 1991; Mia, 1993; Gul & Chia, 1994; Mia & Chenhall, 1994).

Hayes (1977) concluded that financial information is inadequate to evaluate the performance of units that are considerably affected by external environment. For example, managers in marketing units face greater environment exposure relative to production units and tend to evaluate their units in non-financial terms and place greater emphasis on external information. Gordon and Narayanan (1984) suggested that MAS was a function of its PEU, with external, non-financial and futuristic information needed for organisation facing a high PEU. They argued that in a perceived low PEU, decision makers needed information for control and coordination, while in a perceived high PEU, managers required additional information for planning, in addition to control and coordination. Chenhall and Morris (1986) partially replicated Gordon and Narayanan’s (1984) study and confirmed the linkage between PEU and MAS. Specifically, they found that managers in high PEU situations perceived broad scope and timeliness information to be useful in decision making.

Gul (1991) tested PEU as a moderating variable in the relationship between MAS and small business manager’s performance. His results showed that a sophisticated MAS is associated with improved performance if PEU is high. However, low PEU and sophisticated MAS can be detrimental to manager’s performance because of information overload. Gul and Chia (1994) examined a three-way interaction between MAS, PEU and structure on managerial performance. They found that under conditions of high PEU, the availability of MAS information characteristics in terms of broad scope and aggregation, and decentralisation were associated with high managerial performance. However, under
low conditions of PEU, the availability of MAS information characteristics in terms of broad scope and aggregation and decentralisation were associated with low managerial performance. Mia (1993) found that PEU has no direct influence on performance but acted indirectly through the use of broad scope MAS information. Mia and Chenhall's (1994) found that marketing managers who faced more task uncertainty used more broad scope information relative to production managers to cope with uncertainty.

Thus far, the literature supports the notion that the amount of MAS information that managers use for decision making is a function of their PEU. As the environment becomes more uncertain, managers need to process and use more information to cope with the uncertainty.

Based on the argument, the following hypothesis is tested:

\[ H_3 : \text{There is a direct relationship between managers' PEU and the extent to which managers' use of broad scope MAS information for decision making} \]

The Relationship Between Broad Scope MAS Information and SBU Performance

A manager's decision making and performance is influenced by an organisation's information system. According to Ferris & Haskins (1988), an organisation's information system functions as a learning system for those individuals acting on behalf of the organisation about problems, outcomes and opportunities. In turn, this learning process will enable an individual to make appropriate decisions. Broad scope MAS information is seen as facilitating managers' decision making processes within organisations (Gordon &
Narayanan, 1984; Ferris & Haskins, 1988). As a result, an informed manager may take appropriate actions which may lead to improved performance.

Recent studies (e.g., Gul, 1991; Mia, 1993; Gul & Chia, 1994) have lent considerable empirical support to the hypothesis that a "fit" between high PEU and broad scope MAS information is more likely to improve performance than a "misfit". Mia (1993), for example, concluded that by using additional information, managers would understand and perform their jobs better. Mia (p. 271) suggested that "MAS information is used for managerial decision making because such information enables managers to make more appropriate (accurate) decision leading to improvement in their performance".

Based on the argument, the following hypothesis is tested:

H₄: There is a direct relationship between the extent to which managers' use of broad scope MAS information for decision making and SBU performance

The Relationships Between SBU Strategy, Broad Scope MAS Information and SBU Performance

By combining hypotheses (H₂ and H₄), the relationships between: (1) SBU strategy and broad scope MAS information and (2) broad scope MAS information and SBU performance, it is suggested that the impact of SBU strategy on SBU performance is indirect through the extent to which managers use of broad scope MAS information for decision making.

An organisation pursues a prospector-type strategy exposes itself to a wide environmental domain, thereby implying higher PEU. As a result, a greater amount of information would
be required during the decision making process and managers are likely to use broad scope MAS information to cope with uncertainty (Thompson, 1967; Galbraith, 1973; 1977; Mia, 1993). Conversely, if an organisation chooses a defender-type strategy, the environment in which it operates will be relatively narrow, resulting in a lower PEU. This, in turn, will reduce managers' use of broad scope MAS information for decision making.

Thus, it may follow that managers operating in a prospector-type firm will require broad scope MAS information for decision making to enhance SBU performance. On the other hand, managers operating in a defender-type firm will require narrow scope MAS information for decision making. This idea is supported by Abernethy and Guthrie (1994) who suggested that managers in an organisation pursuing a prospector-type strategy use broad scope MAS information in decision making more than those in organisation pursuing defender-type strategy. Specifically, Abernethy and Guthrie found that broad scope MAS information had a more positive impact on performance in prospector-type firms than the impact on performance in defender-type firms. Thus far, the literature seems to suggest that prospector (defender)-type strategy induce managers' use of broad (narrow) scope MAS information to enhance performance under high (low) level of PEU.

Based on the argument, the following hypothesis is tested:

H₅: There is an indirect relationship between SBU strategy and SBU performance through the extent to which managers' use of broad scope MAS information for decision making
The Relationships Between PEU, Broad Scope MAS Information and SBU Performance

By combining hypotheses (H3 and H4), the relationships between: (1) PEU and broad scope MAS information and (2) broad scope MAS information and SBU performance, it is suggested that the impact of PEU on SBU performance is indirect through the extent to which managers use broad scope MAS information for decision making.

Several researchers have argued for the matching of PEU and broad scope MAS information to produce superior performance (Gul, 1991; Mia, 1993; Gul & Chia, 1994; Mia & Chenhall, 1994). An uncertain environment will induce managers to collect more information to reduce uncertainty. A reduction in uncertainty allows managers to perform their jobs more confidently. A low PEU, on the other hand, does not require broad scope MAS information, as too much information may cause information overload, which leads to poor performance.

Gul (1991) and Gul and Chia (1994) provided evidence on the importance of proper matching between PEU and broad scope MAS information to enhance performance. These studies found that under conditions of high PEU, managers should be provided with broad scope MAS information to enhance performance. Their results are further supported by Mia and Chenhall (1994) who concluded that the higher task environment in marketing departments necessitates a broader use of information than production departments. The use of broad scope information in marketing departments is found to be associated with higher performance.

Thus far, the literature seems to suggest that when PEU is low, managers require less information because interpreting the environment is relatively easy. When PEU is high, managers require more information to cope with the uncertainty. More sophisticated
reports from MAS can help them to reduce the uncertainty and improve their decision making (Amey, 1979). Hence, high PEU may induce managers' to use broad scope MAS information for decision making and as a consequence, the relationship between PEU and SBU performance may be due, in part, to the indirect effect of the extent to which managers' use of broad scope MAS information for decision making.

Based on the argument, the following hypothesis is tested:

\[ H_6 : \text{There is an indirect relationship between managers' PEU and SBU performance through the extent to which managers' use of broad scope MAS information for decision making} \]

The Empirical Model

The foregoing discussions lead to the six hypotheses to be tested. The proposed empirical model for this study is shown in Figure 7.
Figure 7. The empirical model
CHAPTER 4

Research Method

Introduction

This chapter presents the research method used in this study. The criteria for the sample selection are discussed. This is followed by a discussion on the data collection procedure. A discussion of the measurement of variables is also presented.

Sample

A total of 130 manufacturing companies were randomly chosen from Kompass Australia (1994/95). From the 130 companies, the names of the 250 managers were gathered. The criteria for inclusion in the sample were as follows: (1) the units were required to have an identifiable business strategy; (2) the respondents were required to have responsibility for operations within the business unit; and (3) the companies must have at least 100 employees in the organisation. Telephone calls were made to each manager to ensure that the above criteria were satisfied and to ascertain whether they were willing to participate in the research project. This resulted in 87 SBU managers for inclusion in the sample. A wide range of industries were represented in the sample. These industries included electrical and electronics products, consumer durables, furniture, printing, steel and metal products, wire and cable, plastic, rubber and tyre, medical and health care products, textile, clothing and footwear. Each participant was sent a questionnaire together with a covering letter and a prepaid self-addressed envelope for the questionnaire to be returned directly to the researcher. The covering letter and
questionnaire are shown in Appendix A and B respectively. Questionnaires were pre-coded to enable non-respondents to be traced and follow-up to be executed. A reminder letter and another copy of the questionnaire was sent to those who had not responded after 2 weeks. The reminder letter is shown in Appendix C.

**Measurement Instruments**

Existing measurement instruments were used to enhance validity and reliability of the measures. The variables incorporated into the questionnaire include SBU strategy, perceived environmental uncertainty, broad scope MAS information and SBU performance. Table 4 provides a summary of the measurement instruments.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBU strategy</td>
<td>Miles &amp; Snow (1978)</td>
</tr>
<tr>
<td>SBU performance</td>
<td>Govindarajan (1984)</td>
</tr>
</tbody>
</table>

SBU strategy.

SBU strategy was measured based on Miles and Snow's (1978) typology. A self-rating measure was used where managers were asked to select the descriptions of prospector or
defender-type strategy which most closely matched their business units. This instrument has been subjected to considerable psychometric assessment (Snow & Hrebiniak, 1980; Hambrick, 1983; Shortell & Zajac, 1990) and has been used in other accounting studies (e.g., Simons, 1987; Abernethy & Guthrie, 1994). Moreover, Miles and Snow’s (1978) typology is more suitable in explaining strategies at business levels rather than at corporate levels (Hambrick, 1983) and found to be applicable across industries (Miles & Snow, 1978; Snow & Hrebiniak, 1980).

Respondents were required to identify their most likely business level strategy relative to other business units in the industry. Prospector and defender-type strategies were given brief descriptions with a suggestion that both types of generic strategies are equal. The measurement instrument is shown in Section A of the questionnaire in Appendix B.

**Perceived environmental uncertainty (PEU).**

Perceived environmental uncertainty was measured using a seven-item, seven-point Likert-type scale instrument developed by Gordon and Narayanan (1984). A manager’s score for PEU was the average of the manager’s scores under each of the seven items.

This instrument relates to the external environment facing an organisation. The seven items were designed to measure the respondents' perceptions about the predicability and stability in various aspects of their organisation's industrial, economic, technological, competitive and customer environment. The predicability and stability of environment are related to the intensity of competition and the controllability of external events facing the organisation. The seven-item instrument is shown in Section B of the questionnaire in Appendix B.
Broad scope management accounting systems (MAS) information.

Broad scope MAS information was measured by a six-item, five-point Likert-type scale instrument developed by Chenhall and Morris (1986) and is widely used by other accounting researchers (e.g., Abernethy & Guthrie, 1994; Mia & Chenhall, 1994; Gul & Chia, 1994; Chong, in press).

In defining the usage of MAS, researchers have relied on managers' perceptions of broad scope MAS information. Prior studies have adopted varying degrees of managers' perceptions of broad scope MAS information such as perceived usefulness (Chenhall & Morris, 1986), perceived availability (Gul, 1991; Gul & Chia, 1994) and perceived importance (Mia, 1993; Abernethy & Guthrie, 1994) and the extent of use (Mia & Chenhall, 1994; Chong, in press).

The original instrument asked the respondents to rate the "perceived usefulness" of MAS information. Chong (in press) argues that "to link 'perceived usefulness' of MAS information to performance, however, is unrealistic as it is the 'extent of use' of MAS information that enhances decision effectiveness and ultimately impact on managers' performance". In this study, managers were asked to rate "the extent of use" of broad scope MAS information available from their organisation's MAS. They were asked to consider the extent of use of broad scope MAS information in the context of their daily decision making activities. The six-item instrument is shown in Section C of the questionnaire in Appendix B.
SBU performance.

SBU performance was measured by a self-rating scale using an instrument originally developed by Govindarajan (1984) and subsequently used by other accounting researchers (e.g., Govindarajan & Gupta, 1985; Abernethy & Guthrie, 1994). Managers were required to rate each of the twelve dimensions on a five-point Likert-type scale, ranging from (1) "of little importance" to (5) "extremely important", indicating the degree of importance attached by his superiors to his business unit's performance on that dimension. The twelve dimensions are sales growth rate, market share, operating profit, profit margin, cash flow, return on investment, new product development, market development, R & D, cost reduction programs, personnel training development and political/public affairs. Next, the managers were asked to rate each of the twelve dimensions of SBU performance as compared with his/her assessment of superior's expectations of the SBU along that dimensions. Again, a five-point Likert-type scale ranging from (1) "not at all satisfactory" to (5) "outstanding" was used. Using the data on the dimensional importance obtained as weights, a weighted average SBU performance index was obtained. The twelve-item instrument is shown in Section D and E of the questionnaire in Appendix B.

Measurement of performance has generated a great deal of debate. The issue is about the appropriateness of superior versus self-rating in measuring performance. Advocates for superior performance evaluation argued that self-rating tends to have higher mean values (leniency error), and less variability (restriction or range error) than superior rating (Parker, Taylor, Barrett & Martens, 1959; Prien & Liske, 1962; Thornton, 1968). However, Heneman (1974) found favourable results for self-rating. Venkatraman and Ramanujam (1987) argued that neither objective or self-rating scale are intrinsically superior to each other. In addition, Abernethy & Guthrie (1994) argued that self-assessment instruments can produce more reliable and uninhibited responses from managers as they are assured anonymity and confidentiality.
CHAPTER 5

Results

Introduction

This chapter presents the background of the respondents and their respective firms. The results on the tests of the validity and reliability of the instruments are presented. Additionally, the results on the test of the six hypotheses are also presented in this chapter.

Demographic Data

From a total of 87 questionnaires that were sent to SBU managers, 70 questionnaires were returned, which yielded an 80.46% response rate. Because of the high response rate, no test for non-response bias is considered necessary. Eight responses were non-usa ble as the questionnaires were not fully completed. Therefore, this leaves the study with 62 usable responses for data analysis.

The respondents had held their current positions for an average of 6 years and had been employed by their respective companies for an average of 9.8 years. The average length of experience in their areas of management was 9.5 years and the average number of employees in their areas of responsibility was 106. The average number of employees in the sample firms was 360 employees.
Cronbach Alpha Coefficient for Internal Reliability

Reliability is "the degree to which the observed variables measures the ‘true’ value and is ‘error free’" (Hair, Anderson, Tatham & Black, 1995, p. 9). The Cronbach alpha coefficient measures the internal consistency of a multi-item scale (Cronbach, 1951). In this study, Cronbach alpha statistics were computed for the following scales: (1) PEU, (2) broad scope MAS information and (3) SBU performance.

Factor Analysis for Construct Validity

Factor analysis is a multivariate statistical method that is concerned with the purpose of defining the underlying structure in a data matrix. It addresses the problem of analysing the structure of the inter-relationship among a large number of variables by defining a set of common underlying dimension (Hair et al., 1995). Factor analysis is used in this study to test for construct validity (Kerlinger, 1964). The items in each variable were analysed using the principal components method. The solution produced: (1) the rotated factor matrix, (2) the Eigenvalue of each factor and (3) the percentage of total variance explained.
Perceived environmental uncertainty (PEU).

The Cronbach alpha coefficient (Cronbach, 1951) for PEU was 0.95, which indicated a very high internal reliability for the scale (Nunnally, 1967). The results of the factor analysis are shown in Table 5.

Table 5
Factor Analysis of PEU

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 How intensive is each of the following in your industry?</td>
<td></td>
</tr>
<tr>
<td>a. Bidding for purchase or raw materials</td>
<td>0.708</td>
</tr>
<tr>
<td>b. Competition for manpower</td>
<td>0.818</td>
</tr>
<tr>
<td>c. Price competition</td>
<td>0.824</td>
</tr>
<tr>
<td>2 How many new products and/or services have been marketed during the past 5 years by your industry?</td>
<td>0.816</td>
</tr>
<tr>
<td>3 How stable/dynamic is the external environment (economic and technological) facing your firm?</td>
<td></td>
</tr>
<tr>
<td>a. Economic</td>
<td>0.877</td>
</tr>
<tr>
<td>b. Technological</td>
<td>0.851</td>
</tr>
<tr>
<td>4 How would you classify the market activities of your competitors during the past 5 years?</td>
<td>0.837</td>
</tr>
<tr>
<td>5 During the past 5 years, the tastes and preferences of your customers.</td>
<td>0.909</td>
</tr>
<tr>
<td>6 During the past 5 years, the legal, political and economic constraints surrounding your firm.</td>
<td>0.815</td>
</tr>
<tr>
<td>7 How often do new scientific discoveries emerge in your industry?</td>
<td>0.795</td>
</tr>
</tbody>
</table>

Eigenvalue = 6.83; Total variance explained = 68.31%
Broad scope MAS information.

The Cronbach alpha coefficient (Cronbach, 1951) for broad scope MAS information was 0.92, which indicated a very high internal reliability for the scale (Nunnally, 1967). The results of the factor analysis are shown in Table 6.

Table 6
Factor Analysis of Broad Scope MAS Information

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 External, <em>ex post</em> financial information (e.g., past trends in sales and profits of companies in your industry)</td>
<td>0.766</td>
</tr>
<tr>
<td>2 Internal, <em>ex ante</em> financial information (e.g., future prediction of sales and expenses for your company)</td>
<td>0.857</td>
</tr>
<tr>
<td>3 Non-economics information, such as customer preferences, employee attitudes, labor relations, attitudes of government and consumer bodies, competitive events, etc.</td>
<td>0.848</td>
</tr>
<tr>
<td>4 Information on broad factors external to your organization, such as economic conditions, population growth, technological developments, etc.</td>
<td>0.882</td>
</tr>
<tr>
<td>5 Non-financial information that relates to production information such as output rates, scrap levels, machine efficiency, employee absenteeism, new product lead time, schedule attainment, etc.</td>
<td>0.885</td>
</tr>
<tr>
<td>6 Non-financial information that relates to market information such as market size, market share, etc.</td>
<td>0.883</td>
</tr>
</tbody>
</table>

Eigenvalue = 4.38; Total variance explained = 73.02%
SBU performance.

The Cronbach alpha coefficient (Cronbach, 1951) for the weighted index of SBU performance was 0.95, which indicated a very high internal reliability for the scale (Nunnally, 1967). The results of the factor analysis are shown in Table 7.

Table 7
Factor Loading of the Weighted Index of SBU Performance

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Sales growth rate</td>
<td>0.725</td>
</tr>
<tr>
<td>2 Market share</td>
<td>0.753</td>
</tr>
<tr>
<td>3 Operating profit</td>
<td>0.770</td>
</tr>
<tr>
<td>4 Profit margin</td>
<td>0.838</td>
</tr>
<tr>
<td>5 Cash flow</td>
<td>0.886</td>
</tr>
<tr>
<td>6 Return on investment</td>
<td>0.880</td>
</tr>
<tr>
<td>7 New product development</td>
<td>0.840</td>
</tr>
<tr>
<td>8 Market development</td>
<td>0.798</td>
</tr>
<tr>
<td>9 Research and development</td>
<td>0.824</td>
</tr>
<tr>
<td>10 Cost reduction programmes</td>
<td>0.750</td>
</tr>
<tr>
<td>11 Personnel training development</td>
<td>0.707</td>
</tr>
<tr>
<td>12 Political and public affairs</td>
<td>0.837</td>
</tr>
</tbody>
</table>

Eigenvalue = 7.73, Total variance explained = 64.44%.

An additional analysis on the weighted index of SBU performance dimensions indicated that the dimensions were highly intercorrelated. The results gave further support to the
construct validity of the SBU performance. Table 8 presents the intercorrelations matrix for each dimension of SBU performance.

**Descriptive Statistics**

Table 9 presents the descriptive statistics of SBU strategy, PEU, broad scope MAS information and the weighted index of SBU performance.

**Table 9**

**Descriptive Statistics**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Theoretical</td>
</tr>
<tr>
<td>$X_1$ SBU strategy</td>
<td>-</td>
<td>-</td>
<td>0.00-1.00</td>
</tr>
<tr>
<td>$X_2$ PEU</td>
<td>4.29</td>
<td>1.60</td>
<td>1.00-7.00</td>
</tr>
<tr>
<td>$X_3$ Broad scope MAS info</td>
<td>3.24</td>
<td>1.21</td>
<td>1.00-5.00</td>
</tr>
<tr>
<td>$X_4$ SBU performance</td>
<td>3.53</td>
<td>0.79</td>
<td>1.00-5.00</td>
</tr>
</tbody>
</table>

**Pearson Correlation**

Table 10 shows the Pearson Correlation of SBU strategy, PEU, broad scope MAS information and SBU performance.
### Table 8

**Intercorrelations Matrix for the Weighted Index of SBU Performance Dimensions**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sales growth rate</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Market share</td>
<td>0.796</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Operating profit</td>
<td>0.696</td>
<td>0.613</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Profit margin</td>
<td>0.616</td>
<td>0.646</td>
<td>0.871</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Cash flow</td>
<td>0.640</td>
<td>0.610</td>
<td>0.692</td>
<td>0.787</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Return on investment</td>
<td>0.587</td>
<td>0.610</td>
<td>0.664</td>
<td>0.757</td>
<td>0.895</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>New product development</td>
<td>0.482</td>
<td>0.553</td>
<td>0.475</td>
<td>0.577</td>
<td>0.676</td>
<td>0.713</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Market development</td>
<td>0.606</td>
<td>0.572</td>
<td>0.521</td>
<td>0.550</td>
<td>0.638</td>
<td>0.615</td>
<td>0.760</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Research and development</td>
<td>0.475</td>
<td>0.496</td>
<td>0.455</td>
<td>0.528</td>
<td>0.648</td>
<td>0.688</td>
<td>0.904</td>
<td>0.740</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Cost reduction programmes</td>
<td>0.342</td>
<td>0.410</td>
<td>0.520</td>
<td>0.583</td>
<td>0.594</td>
<td>0.615</td>
<td>0.536</td>
<td>0.621</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Personnel training development</td>
<td>0.264</td>
<td>0.355</td>
<td>0.426</td>
<td>0.489</td>
<td>0.547</td>
<td>0.567</td>
<td>0.619</td>
<td>0.545</td>
<td>0.656</td>
<td>0.753</td>
<td>1.000</td>
</tr>
<tr>
<td>12</td>
<td>Political and public affairs</td>
<td>0.503</td>
<td>0.617</td>
<td>0.487</td>
<td>0.640</td>
<td>0.742</td>
<td>0.740</td>
<td>0.675</td>
<td>0.600</td>
<td>0.691</td>
<td>0.705</td>
<td>0.621</td>
</tr>
</tbody>
</table>
Table 10

Pearson Correlation Matrix for Independent and Dependent Variables

<table>
<thead>
<tr>
<th></th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
<th>$X_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1$</td>
<td>SBU strategy</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_2$</td>
<td>PEU</td>
<td>0.529*</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>$X_3$</td>
<td>Broad scope MAS information</td>
<td>0.637*</td>
<td>0.728*</td>
<td>1.000</td>
</tr>
<tr>
<td>$X_4$</td>
<td>SBU performance</td>
<td>0.568*</td>
<td>0.632*</td>
<td>0.728*</td>
</tr>
</tbody>
</table>

*p < 0.01

Test for Normality

The normal probability plot of the residuals is a common test for normality. It compares the cumulative distribution of actual data values with the cumulative distribution of a normal distribution (Hair, et al., 1995). Appendix D presents the normal probability plots of the regression models used in this study. The plots show that the residuals of each model are fairly normal distributed, as the line representing the actual data distribution approximates a straight diagonal line. Hence, the normality assumptions are not violated in the regression models and the adequacy of the multiple linear regression model used. Thus, the results of the test for normality adds confidence to the validity of the statistical tests obtained in this study.

Test for Hypotheses

A path analytic technique was used to test the hypothesised relationship. This technique allows the examination of the direct, indirect and the spurious effects (Duncan, 1966;
The equations to the structural model are shown as follows:

\[
X_2 = P_{21}X_1 + P_{2a}R_a
\]

\[
X_3 = P_{31}X_1 + P_{32}X_2 + P_{3b}R_b
\]

\[
X_4 = P_{41}X_1 + P_{42}X_2 + P_{43}X_3 + P_{4c}R_c
\]

where \( X_i = \) the variables measured

\( P_{ij} = \) the standardised partial regression coefficients (path coefficient)

\( R_i = \) the standardised residuals

The direct and indirect effects among the variables can be estimated by combining the path coefficients and the zero-order correlation coefficients as shown in Table 12.
Table 12

Decomposition of the Direct, Indirect and Spurious Effects in the Path Model

<table>
<thead>
<tr>
<th>Path linkages</th>
<th>Zero-order correlation</th>
<th>Direct effects</th>
<th>Indirect effects</th>
<th>Spurious effects</th>
<th>Unanalysed relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>From SBU strategy ((X_1)) to PEU ((X_2))</td>
<td>(r_{12})</td>
<td>(P_{21})</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>From SBU strategy ((X_1)) to broad scope MAS information ((X_3))</td>
<td>(r_{13})</td>
<td>(P_{31})</td>
<td>-</td>
<td>-</td>
<td>(P_{32}r_{12})</td>
</tr>
<tr>
<td>From PEU ((X_2)) to broad scope MAS information ((X_3))</td>
<td>(r_{23})</td>
<td>(P_{32})</td>
<td>-</td>
<td>-</td>
<td>(P_{31}r_{12})</td>
</tr>
<tr>
<td>From SBU strategy ((X_1)) to SBU performance ((X_4))</td>
<td>(r_{14})</td>
<td>(P_{41})</td>
<td>(P_{42}r_{12} + P_{43}r_{13})</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>From PEU ((X_2)) to SBU performance ((X_4))</td>
<td>(r_{24})</td>
<td>(P_{42})</td>
<td>(P_{41}r_{12} + P_{43}r_{23})</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>From broad scope MAS information ((X_3)) to SBU performance ((X_4))</td>
<td>(r_{34})</td>
<td>(P_{43})</td>
<td>-</td>
<td>(P_{41}r_{13} + P_{42}r_{23})</td>
<td>-</td>
</tr>
</tbody>
</table>
Analysis of the direct effect hypotheses.

Hypothesis H₁ states that there is a direct relationship between SBU strategy and PEU. To test the hypothesis, PEU was regressed on SBU strategy by using the model presented in equation (1). The results presented in Table 13 indicate a positive and significant relationship \( (P_{21} = 0.529, p < 0.001) \) between SBU strategy and PEU, thereby supporting hypothesis H₁.

Table 13
Results of Regressing PEU \( (X₂) \) against SBU Strategy \( (X₁) \)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Path coefficient</th>
<th>Coefficient value</th>
<th>t-value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-</td>
<td>0.000</td>
<td>13.015</td>
<td>0.000</td>
</tr>
<tr>
<td>( X₁ ) SBU strategy</td>
<td>( P_{21} )</td>
<td>0.529</td>
<td>4.829</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Adjusted \( R^2 = 0.268; \ R^2 = 0.280; \ F_{1,60} = 23.323; \ \text{signif.} \ 0.000 \)

Hypothesis H₂ states that there is a direct relationship between SBU strategy and the extent to which managers' use of broad scope MAS information for decision-making; while hypothesis H₃ states that there is a direct relationship between PEU and the extent to which managers' use of broad scope MAS information for decision-making. Hypotheses H₂ and H₃ were tested by regressing the extent to which managers' use of broad scope MAS information against PEU and SBU strategy, fitting the model presented in equation (2). The results pertaining to the hypotheses H₂ and H₃ are reported in Table 14. The coefficient for the path \( (P_{31}) \) linking SBU strategy and the extent to which managers' use of broad scope MAS information was positive and significant \( (P_{31} = 0.350, p < 0.001) \). Thus, hypothesis H₂ is supported. The coefficient for the path \( (P_{32}) \) linking PEU and the extent
to which managers' use of broad scope MAS information was positive and significant ($P_{32} = 0.543, p < 0.001$). Thus, hypothesis H₃ is also supported.

Hypotheses H₄, H₅ and H₆ were tested by regressing SBU performance against the extent to which managers' use of broad scope MAS information, PEU and SBU strategy, fitting the model presented in equation (3). Hypothesis H₄ states that there is a direct relationship between the extent to which managers' use of broad scope MAS information for decision making and SBU performance. The results in Table 15 show that the coefficient for path ($P_{43}$) that linked the extent to which managers' use of broad scope MAS information and SBU performance was positive and significant ($P_{43} = 0.487, p < 0.001$). Thus, hypothesis H₄ is supported.

Hypothesis H₅ proposed that there is an indirect relationship between SBU strategy and SBU performance through managers' use of broad scope MAS information for decision making; while hypothesis H₆ proposed that there is an indirect relationship between managers' PEU and SBU performance through managers' use of broad scope MAS information for decision making. The results in Table 15 show that the coefficient for path

---

**Table 14**

Results of Regressing Broad Scope MAS Information ($X_3$) against PEU ($X_2$) and SBU Strategy ($X_1$)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Path coefficient</th>
<th>Coefficient value</th>
<th>t-value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-</td>
<td>0.000</td>
<td>3.611</td>
<td>0.001</td>
</tr>
<tr>
<td>$X_1$ SBU strategy</td>
<td>$P_{31}$</td>
<td>0.350</td>
<td>3.690</td>
<td>0.001</td>
</tr>
<tr>
<td>$X_2$ PEU</td>
<td>$P_{32}$</td>
<td>0.543</td>
<td>5.729</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Adjusted $R^2 = 0.605$; $R^2 = 0.618$; $F_{2,59} = 47.779$; signif. 0.000
(P42) that linked SBU performance and PEU was not significant (P42 = 0.195, p < 0.131).

Similarly, the coefficient for path (P41) that linked SBU performance and SBU strategy was also not significant (P41 = 0.155, p < 0.176). These results provide initial support for hypotheses H5 and H6.

Table 15

Results of Regressing SBU Performance (X4) against Broad Scope MAS Information (X3), PEU (X2) and SBU Strategy (X1)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Path coefficient</th>
<th>Coefficient value</th>
<th>t-value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td></td>
<td>0.000</td>
<td>8.915</td>
<td>0.000</td>
</tr>
<tr>
<td>X1 SBU strategy</td>
<td>P41</td>
<td>0.155</td>
<td>1.369</td>
<td>0.176</td>
</tr>
<tr>
<td>X2 PEU</td>
<td>P42</td>
<td>0.195</td>
<td>1.533</td>
<td>0.131</td>
</tr>
<tr>
<td>X3 Broad scope MAS info</td>
<td>P43</td>
<td>0.487</td>
<td>3.475</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Adjusted R^2 = 0.543; R^2 = 0.565; F3,58 = 25.158; signif. 0.000

Analysis of the indirect effect hypotheses.

To assist in the interpretation of the indirect effect hypotheses (H5 and H6), the hypotheses H5 and H6 were tested by examining the decomposition of the zero-order correlations between: (1) SBU strategy/SBU performance link, and (2) PEU/SBU performance link. Line 4 of Table 16 presents the decomposition of SBU strategy/SBU performance link. The results show a significant zero-order correlation (r14 = 0.568, p < 0.01) comprises a relatively small and insignificant direct component (P41 = 0.155, p < 0.176), supplemented by a positive and significant indirect effect (P42 r12 + P43 r13 = 0.413). This result provides further support for hypothesis H5 of the study. Such findings
suggest the importance of assessing the effects of SBU strategy on the extent to which managers' use of broad scope MAS information for managerial decisions, and of the latter's effect on SBU performance. The result provide further insight into the precise effects of SBU strategy on MAS design.

Line 5 of Table 16 presents the decomposition of PEU/SBU performance link. The results show a significant zero-order correlation ($r_{24} = 0.632, p < 0.01$) comprises an insignificant direct component ($P_{42} = 0.195, p < 0.131$), supplemented by a positive and significant indirect effect ($P_{41} r_{12} + P_{43} r_{23} = 0.437$). This result provides further support for hypothesis H6 of the study. The results indicate that a large part of the observed association between PEU and SBU performance is explained by the intervening indirect effect of the extent to which managers' use of broad scope MAS information for decision making. Therefore, it is only via a simultaneous assessment of PEU's effect on the extent to which managers' use of broad scope MAS information for managerial decisions, and of the latter's effect on SBU performance, that we can gain further insight into the precise effects of PEU on MAS design.

The path coefficients obtained for all the relationships proposed in hypotheses H1, H2, H3, H4, H5 and H6 are shown in Table 16 and Figure 8.
Table 16

Results of the Decomposition of the Direct, Indirect and Spurious Effects

<table>
<thead>
<tr>
<th>Path linkages</th>
<th>Zero-order correlation</th>
<th>Direct effects</th>
<th>Indirect effects</th>
<th>Spurious effects</th>
<th>Unanalysed relation</th>
<th>Total relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>From SBU strategy (X₁) to PEU (X₂)</td>
<td>0.529</td>
<td>0.529</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.529</td>
</tr>
<tr>
<td>From SBU strategy (X₁) to broad scope MAS information (X₃)</td>
<td>0.637</td>
<td>0.350</td>
<td>-</td>
<td>-</td>
<td>0.287</td>
<td>0.637</td>
</tr>
<tr>
<td>From PEU (X₂) to broad scope MAS information (X₃)</td>
<td>0.728</td>
<td>0.543</td>
<td>-</td>
<td>-</td>
<td>0.185</td>
<td>0.728</td>
</tr>
<tr>
<td>From SBU strategy (X₁) to SBU performance (X₄)</td>
<td>0.568</td>
<td>0.155</td>
<td>0.413</td>
<td>-</td>
<td>-</td>
<td>0.568</td>
</tr>
<tr>
<td>From PEU (X₂) to SBU performance (X₄)</td>
<td>0.632</td>
<td>0.195</td>
<td>0.437</td>
<td>-</td>
<td>-</td>
<td>0.632</td>
</tr>
<tr>
<td>From broad scope MAS information (X₃) to SBU performance (X₄)</td>
<td>0.728</td>
<td>0.487</td>
<td>-</td>
<td>0.241</td>
<td>-</td>
<td>0.728</td>
</tr>
</tbody>
</table>
Figure 8. Path coefficients

Note. — — — insignificant paths
—— — — significant paths
CHAPTER 6

Conclusions

Introduction

This study examined the impact of the use of accounting information on performance in firms pursuing different strategic priorities under various conditions of perceived environmental uncertainty. This study focused on broad scope MAS information characteristics. Miles and Snow's (1978) extreme typology of defender and prospector-types are adopted to classify business units' competitive strategic priorities.

The motivation for the study comes from the need to provide further empirical evidence on the impact of strategy on accounting information and to develop an integrated research framework. Literature review and prior studies have provided strong support for the linkages between PEU, MAS and performance, but these studies have ignored organisational strategy as a contingent variable in their research framework (e.g., Mia, 1993; Gul, 1991; Gul & Chia, 1994). Other studies have examined the systematic differences in control systems in firms pursuing different strategic priorities, but these studies did not explicitly test for the impact of firms' environments (e.g., Simons, 1987; Abernethy & Guthrie, 1994). Additionally, there are only limited studies which examined the role of information characteristics in firms pursuing different strategies. Furthermore, the results on the linkage between strategy and accounting control systems have been equivocal (e.g., Simons, 1987; Govindarajan, 1988).

Adopting a contingency view, SBU strategy and PEU were hypothesised to affect the MAS design which, in turn, will influence SBU performance. Six hypotheses were generated. A
survey research methodology was used to test the hypotheses. Questionnaires were administered to SBU managers in Western Australia’s manufacturing firms. The data were analysed by using a path analytic technique.

Findings of the Study

The results suggest the presence of a contingent relationship between broad scope MAS information and SBU performance for firms pursuing different SBU strategy and under varying conditions of PEU. The results of this study were consistent with the notion that under high (low) PEU, the use of broad (narrow) scope MAS information by managers operating in firms pursuing prospector (defender)-type strategy led to improved SBU performance.

Contributions of the Study

This study contributes to the accounting literature in several ways. First, it has improved our understanding of the role of organisation strategic priorities and perceived environmental uncertainty on the relation between MAS design and SBU performance. The results provide evidence to support the propositions that SBU strategy and PEU are important antecedents of MAS design. Support was also found for the proposition that MAS design was an antecedent of SBU performance. Specifically, the results indicate that managers operating in organisations pursuing prospector (defender)-type strategy tend to perceive higher (lower) uncertainty in the environment and find broad (narrow) scope MAS information to be useful in enhancing their decision making, which in turn, contributing to the improvement of the SBU performance.
Second, the study has extended prior research work in the area of MAS design by developing an integrated research framework. The results relating to SBU strategy, the extent to which managers' use of broad scope MAS information and SBU performance are consistent with those of prior studies (e.g., Abernethy & Guthrie, 1994). Specifically, the results indicate that managers operating in prospector (defender)-type business unit should be provided with broad (narrow) scope MAS information to enhance their decision making processes. In addition, the results relating to PEU, the extent to which managers' use of broad scope MAS information and SBU performance are also consistent with those of prior studies (e.g., Mia, 1993; Gul, 1991; Gul & Chia, 1994). Specifically, managers should be provided with broad (narrow) scope MAS information for decision making under high (low) conditions of PEU.

In summary, the study indicates the importance of strategy and environment as contingent variables that affect the design of MAS. In addition, the results provide empirical evidence to support the view that there must be an appropriate "fit" between contextual variables and MAS information characteristics to enhance organisational performance.

Limitations and Suggestions for Further Research

As there are limitations in other empirical studies, this study is no exception. First, the use of two extreme strategies (prospectors-defenders) in Miles and Snow's (1978) typology poses a potential limitation for this study. Miles and Snow have identified another viable competitive strategy, analysers, which is a hybrid of prospectors and defenders. Analysers makes fewer and slower product/market changes than prospectors, and they are less committed to maintaining stable products and process efficiencies than defenders. Consequently, Miles and Snow suggested that analysers' information needs are fundamentally different from either prospectors or defenders. Although it is possible that
some business units in the sample fit the analyser-type descriptions, all respondents in this study were required to categorise their business units into either a prospector or defender-type strategy. The effect of the forced choice on managers regarding strategy in this study cannot be determined. Future research can extend the literature by adopting a more comprehensive typology (i.e., include the possibility of an analyser-type strategy) or different typologies.

A second limitation is the problem of generalisability of the results of this study. Since the sample was drawn randomly from manufacturing firms only, caution should be exercised when generalising the results to non-manufacturing industries (e.g., service industries).

Third, the SBU performance was measured by a self-rating scale. As there are ongoing debates on the value of superior versus self-rating, there is a possibility that the use of a self-rating scale to measure SBU performance is likely to have higher mean values/lack of variability error, and a restricted range/lower variability error in the score (Thornton, 1968; Prien & Liske, 1962).

Finally, the use of a path model can only imply causality between the variables. The survey research methodology allows for the examination of statistical associations at one point in time, and the statements about the direction of relationships can only be made in terms of consistency of results with the effects proposed in the theoretical discussion. Future research can employ different research methods (e.g., longitudinal field studies) to systematically investigate the theoretical causal relationships proposed in this study.

Additionally, future research can incorporate other contingent variable such as the organisation's hierarchy structure. The information needs of managers in an organisation are expected to vary between management levels. Managers at top level may have to make more strategic-type decisions compared to low level managers, thus, necessitating a broad
scope MAS information. Finally, the examination of other information characteristics such as timeliness, levels of aggregation and integration would be worthwhile.

Notwithstanding the limitations, this study has provided further extensions to the research work in the area of MAS design (e.g., Simons, 1987; Abernethy & Guthrie, 1994) by developing an integrated research framework. More importantly, this study has improved our understanding of the role of strategy and environment on MAS design. Such understanding has important implications for the design of an effective MAS which provides relevant and useful information for managers to make better decisions and improve organisational performance.
Footnotes

1. MAS design was defined in terms of four information characteristics such as broad scope, timeliness, aggregation and integration (Chenhall & Morris, 1986). These information characteristics are discussed in Chapter Three.

2. The notion of “fit” is the key concept of contingency theory. See Van de Ven & Drazin (1985) for a detailed discussion.

3. Management accounting system (MAS) is considered a control sub-system of “an overall organisation control package” (see Otley, 1980, p. 421).

4. Broadwalla’s control procedures were: (1) standard costing and variance analysis, (2) marginal costing, (3) flexible budgeting, (4) internal auditing, (5) operational auditing by outside auditors, (6) capital budgeting techniques, (7) statistical quality control, (8) inventory control, (9) production scheduling by operations research techniques, and (10) systematic managerial performance evaluation.

5. Sophisticated MAS is defined as having broad scope, timeliness, aggregated and integrated information characteristics.

6. It is expected that firms with less than this number of employees are unlikely to have clearly defined areas of responsibilities (Brownell & Dunk, 1991).
7. 163 managers were not included in the sample for a number of reasons. First, they failed to meet the criteria. Second, they could not be contacted or have left the companies. Third, some of the companies have ceased operations or moved. Finally, some managers did not want to participate in the research.

8. The calculation of zero-order correlation coefficients assumes that all variables have been measured using an interval scale. In this study, SBU strategy has been measured as a dichotomous variable and therefore violates an important assumption implicit in this measure. An alternative correlation method is to use point biserial correlation based on the following formula (Kaplan, 1987; Baggaley, 1964, p. 18-33):

$$ r_{pb} = \frac{M_h - M_l}{\sqrt{pq}} $$

where
- $r_{pb}$ = point biserial correlation coefficient
- $M_p$ = mean value of the high group
- $M_q$ = mean value of the low group
- $p$ = proportion of cases in the high group
- $q = 1 - p$
- $\sigma^*$ = standard deviation of the total group

Table 11 shows the comparison of zero-order correlation and point biserial coefficients. A test confirmed that there are no statistically significant differences between the two coefficients. Therefore, the use of zero-order correlations in path analysis to test the hypotheses would not affect the results.
Table 11
Comparison Between Zero-order Coefficients and Point Biserial Coefficients

<table>
<thead>
<tr>
<th>Path linkages</th>
<th>Zero-order correlation coefficients</th>
<th>Point biserial coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBU strategy-PEU</td>
<td>0.529</td>
<td>0.525</td>
</tr>
<tr>
<td>SBU strategy-MAS</td>
<td>0.637</td>
<td>0.632</td>
</tr>
<tr>
<td>SBU strategy-SBU performance</td>
<td>0.568</td>
<td>0.564</td>
</tr>
</tbody>
</table>
References


Appendix A

21 August 1995

«NAME»
«TITLE»
«ADDRESS»

Dear «SALUTATION»,

Re: Research Project

Thank you for agreeing to take part in this survey. The objective of this survey is to gather information on the role of accounting information in organization pursuing different strategic priorities.

We realise that you have many demands on your time, and as such, we greatly appreciate the 10 minutes you are likely to spend in completing this questionnaire. We shall be glad if you can complete and return the questionnaire to us within the next few days. A prepaid self-addressed envelope is enclosed for your convenience.

All responses to the questionnaire will be kept strictly confidential. If you have any question, please do not hesitate to call Vincent Chong on (09) 273-8737.

Thank you for your time and co-operation.

Yours faithfully,

Vincent K. Chong
Lecturer in Accounting

Kar Ming Chong
Research Scholar

End.
Appendix B

This appendix contains the questionnaire administered to SBU managers.
A STUDY ON THE ROLE OF ACCOUNTING INFORMATION IN ORGANIZATION PURSUING DIFFERENT STRATEGIC PRIORITIES

SECTION (A):

1. Which one of the following descriptions most closely fits your business compared to other firms in the industry?

(Please consider your business as a whole and note that neither of the types listed below is inherently "good" or "bad")

The two organizational types described below are generic and may not exactly represent your business. Please try to choose the type which you think your business fits closest to. Tick the appropriate box below.

☐ Type 1

or

☐ Type 2

Type 1 - This type of business

- Attempts to locate and maintain a secure niche in a relatively stable product or service area.
- Offers a more limited or more specialised range of products or services than its competitors.
- Offers a difference (e.g., higher quality, superior service, lower prices, unique styling, etc.) to protect its domain.
- Is not at the forefront of developments in the industry.
- Tends not to be influenced by industry changes that have no direct influence on current areas of operation.
- Concentrates on doing the best job possible in a limited area.

Type 2 - This type of business

- Typically operates within a broad product-market domain that undergoes periodic redefinition.
- Values being "first in" in new product and market areas even if not all these efforts prove to be highly profitable.
- Responds rapidly to early signals concerning areas of opportunity, and these responses often lead to a new round of competitive actions.
- May not maintain market strength in all of the areas it enters.

2. In the previous question, you selected a particular description of your business. Which description (i.e. Type 1 or 2) best fits your business for the period:

1 - 3 years ago ____________

1 - 3 years from now ____________
SECTION (B): Please respond by circling a number 1 to 7 based on the following scale for each of the items.

1. How intensive is each of the following in your industry?

<table>
<thead>
<tr>
<th>Of negligible intensity</th>
<th>Extremely intense</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Bidding for purchase or raw materials</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>b. Competition for manpower</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>c. Price competition</td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

2. How many new products and/or services have been marketed during the past 5 years by your industry?

<table>
<thead>
<tr>
<th>None</th>
<th>Many</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

3. How stable/dynamic is the external environment (economic and technological) facing your firm?

<table>
<thead>
<tr>
<th>Very stable (changing slowly)</th>
<th>Very dynamic (changing rapidly)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Economic</td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>b. Technological</td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

4. How would you classify the market activities of your competitors during the past 5 years?

<table>
<thead>
<tr>
<th>Becoming more predictable</th>
<th>Becoming less predictable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

5. During the past 5 years, the tastes and preferences of your customers have become:

<table>
<thead>
<tr>
<th>Much easier to predict</th>
<th>Much harder to predict</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

6. During the past 5 years, the legal, political and economic constraints surrounding your firm have:

<table>
<thead>
<tr>
<th>Remained about the same</th>
<th>Have proliferated greatly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

7. How often do new scientific discoveries emerge in your industry?

<table>
<thead>
<tr>
<th>Seldom</th>
<th>Frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
SECTION (C): Please indicate the extent of use of the following information characteristics available from your organization's management accounting systems (MAS) for your overall decision in your sub-unit.

INSTRUCTION: Please respond by circling a number 1 to 5 based on the following scale for each of the question. The meaning of these numbers is as follows:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never/seldom (0-20% of the time)</td>
<td>Occasionally (21-40% of the time)</td>
<td>Half the time (41-60% of the time)</td>
<td>Frequently (61-80% of the time)</td>
<td>Usually/always (81-100% of the time)</td>
</tr>
</tbody>
</table>

1. **External, ex post financial information** (e.g., past trends in sales and profits of companies in your industry)

2. **Internal, ex ante financial information** (e.g., future prediction of sales and expenses for your company)

3. **Non-economics information**, such as customer preferences, employee attitudes, labor relations, attitudes of government and consumer bodies, competitive threats, etc.

4. Information on broad factors external to your organization, such as economic conditions, population growth, technological developments, etc.

5. **Non-financial information** that relates to production information such as output rates, scrap levels, machine efficiency, employee absenteeism, new product lead time, schedule attainment, etc.

6. **Non-financial information** that relates to market information such as market size, market share, etc.

SECTION (D): The questions in this section are about your unit's performance. As you answer the questions try to be objective. Remember that the questions are about your unit's performance, not your performance. Circle the correct number for each question.

Part (A): Please indicate the degree of importance which is attached by your supervisors to each of the following items when evaluating your unit's performance.

<table>
<thead>
<tr>
<th>Of little importance</th>
<th>Extremely important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sales growth rate</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. Market share</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. Operating profit</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. Profit margin</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. Cash flow</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. Return on investment</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. New product development</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. Market development</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. Research and development</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
10. Cost reduction programmes  
11. Personnel training development  
12. Political and public affairs

**Part (B):** Now, please indicate your unit's actual performance as compared with the expectations of the level which should be reached.

<table>
<thead>
<tr>
<th></th>
<th>Not at all Satisfactory</th>
<th>Outstanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sales growth rate</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2.</td>
<td>Market share</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3.</td>
<td>Operating profit</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4.</td>
<td>Profit margin</td>
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</tr>
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<td>5.</td>
<td>Cash flow</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6.</td>
<td>Return on investment</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7.</td>
<td>New product development</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8.</td>
<td>Market development</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9.</td>
<td>Research and development</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10.</td>
<td>Cost reduction programmes</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>11.</td>
<td>Personnel training development</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>12.</td>
<td>Political and public affairs</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

**SECTION (E):** For each of the following questions, please write your answer in the space provided.

1. Name of your company (optional) ____________________________________________
2. Number of employees in your organization (approximately) ____________________
3. Present job title/position ________________________________________________
4. How long have you worked in this organization? __________ years.
5. How long have you in this current position? ____________ years.
6. How many years of experience do you have in your current areas of responsibility __________ years.
7. Number of employees in your areas of responsibility (approximately) ____________

THANK YOU FOR YOUR TIME!
Appendix C

7 September 1995

«NAME»
«TITLE»
«ADDRESS»

Dear «SALUTATION»,

**Re: Research Project**

We refer to our letter dated 21 August 1995 which enclosed a questionnaire for you to complete and a prepaid self-addressed envelope for you to return the completed questionnaire directly to us.

If you have returned the questionnaire, please accept our thanks and appreciation for your time and effort. Your participation in the research project have contributed to our knowledge and understanding of the role of accounting information in organization pursuing different strategic priorities and decision performance.

If you have not yet completed or returned the questionnaire, we would be most grateful if you could do so. We realise that you have many demands on your time, and as such, we greatly appreciate the 10 minutes you are likely to spend in completing this questionnaire. We shall be glad if you can complete and return the questionnaire to us within the next few days. A prepaid self-addressed envelope is enclosed for your convenience.

All responses to the questionnaire will be kept strictly confidential. If you have any question, please do not hesitate to call Vincent Chong on (09) 273-8737.

Thank you for your time and co-operation.

Yours faithfully,

Vincent K. Chong
Lecturer in Accounting

Kar Ming Chong
Research Scholar

*End.*
Appendix D

This appendix contains:

1) Normal probability plot for SBU strategy on PEU;

2) Normal probability plot for SBU strategy, PEU and broad scope MAS information;

3) Normal probability plot for SBU strategy, PEU, broad scope MAS information and SBU performance.
Normal Probability Plot for SBU Strategy on PEU

![Normal Probability Plot](image)
Normal Probability Plot for SBU Strategy, PEU and Broad Scope MAS Information
Normal Probability Plot for SBU Strategy, PEU, Broad Scope MAS Information and SBU Performance