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Management accounting and organizational change : impact of alignment of management accounting system, structure and strategy on performance

Tuan Tuan Mat
Edith Cowan University

MANAGEMENT ACCOUNTING AND ORGANIZATIONAL CHANGE: IMPACT OF ALIGNMENT OF MANAGEMENT ACCOUNTING SYSTEM, STRUCTURE AND STRATEGY ON PERFORMANCE

TUAN ZAINUN TUAN MAT

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School of Accounting, Finance and Economics
Faculty of Business and Law
Edith Cowan University, Perth
Western Australia

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Western Australia

Principal Supervisor: **Professor Malcolm Smith**

Associate Supervisor: **Dr Hadrian Djajadikerta**

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USE OF THESIS

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ABSTRACT

The business environment in Malaysia has changed rapidly over recent decades, and continues to change. Globalization has brought new technology and made the business environment in Malaysia open to greater competition. Central Government economic policy relating to 'knowledge economy (k-economy)' and vision 2020 have also opened the market up for competition and certainly increased technological development. These changes have impacted greatly on the business environment in Malaysia, especially on manufacturing industry, which has been identified as the most active and important contributor to the Malaysian economy.

Literature has identified that changes in both external and internal organizational factors have influenced changes in management accounting practices in organizations. When business organizations respond to challenges by embarking on a change management path, they are faced with the choices of which ones of the many management methods, techniques and systems would be most effective. This is important as the management accounting system plays an important role in providing useful information to management, especially in the decision making process. Many researchers have shown an interest in understanding the way in which management accounting and organizational changes respond to the changing business environment. However, most of this research has to date been conducted in a developed economy setting especially in Western countries.

This study aims to investigate the impact of alignment among the changes in external and internal organizational factors, with the changes in management accounting practice on performance. The framework has been developed based on the literature from Western countries and Malaysia (as well as other less developed countries). The six areas in the framework comprise changes in external organizational factors (namely, competitive environment and advanced manufacturing technology), internal factors (namely, structure and strategies), management accounting practices and performance. To meet the research objectives, a quantitative research design was

adopted involving the use of a mailed survey to collect data from various types of manufacturing companies in Malaysia. In total, 212 valid responses were obtained and analysed. Structural equation modelling, using the CBSEM approach was employed as the main statistical technique to test the hypothesized model. Non parametric techniques were also employed to test the subsidiary hypothesis.

Interestingly, the findings of the study showed significantly different results from those studies conducted in developed countries. It might be due to the government policies which often favour firms in manufacturing industry (e.g., many incentives are given to these firms). The results revealed a positive alignment among the external environmental factors and organizational factors with management accounting practices, which in turn positively impacted on organizational performance. Surprisingly, the findings showed that changes in manufacturing accounting practices and strategies were influenced by changes in advanced manufacturing technology (AMT), but these changes were not influenced by changes in market competition. Results also showed that neither market competition nor AMT had influenced change in organizational structure.

This study also provides evidence of an interrelationship between management accounting practices and structure, but with no evidence of a reciprocal relationship between management accounting practices and strategy. Results from the subsidiary hypotheses also support the main hypotheses. The distinctive findings obtained in this study make a contribution to our knowledge of the relationship between management accounting systems and organizational change, as well as providing helpful insights to practitioners in making decisions in the face of a changing business environment.

DECLARATION

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CHAPTER ONE
INTRODUCTION AND OVERVIEW

1.1   Introduction

In the search to understand management accounting in competitive environments and advance technologies, change has increasingly become a focus for research. Many firms have experienced significant changes in their organizational design, competitive environments and technologies. Business environments exhibit a variety of structures and processes, including flat and horizontal organizational forms, multidimensional matrix structures, networks of "virtual organizations" and self-directed work teams. When business organizations respond to challenges by embarking on a change management path, they are faced with choices of which one of the management methods, techniques, and systems would be most effective (Waldron, 2005).

Every organization is located within a particular configuration of contingencies. It is dependent on the market and technological environment in which it operates its scale and diversity of operations, the technology applied to its work, and the type of personnel it employs. To achieve congruence, an appropriate design is the one which best suits its contextual and operational contingencies. According to Moores and Yuen (2001, p.352), "t*o be internally consistent, organizations must have tightly independent and mutually supportive parts in terms of strategies, structures and*

process". The management of organizations faces a challenge to reinforce the management accounting system, strategies and structures together in order to achieve competitive advantage and enhance performance. Thus, research needs to be carried out to help management make appropriate decisions in order to achieve this congruence.

This study examines companies in Malaysia's manufacturing industry in responding to the rapid changes in technological and competitive environment in Malaysia as a result of globalization. Globalization has changed the environment surrounding organizations operating in developing countries with an increase in uncertainty, intensified industry competition and advanced technology. According to Kassim, Md-Mansur and Idris (2003) globalization brings in new technology and makes a developing country open to greater competition. These changes may affect the choice of management accounting practice (MAP) in an organization and may also result in the need for the firm to reconsider its existing organizational design and strategies in order to fit with the changing environment. This argument is supported by Burns and Scapens (2000) and Shields (1997), who suggest that changes in environment cause changes in organizations, which in turn cause changes in MAP.

As the firm strives to achieve a better fit with its environment, and to be more successful; sustaining and improving current performance will become critical. However, very limited research has taken place into how changes in technological and competitive business environments have caused management accounting and organizational change in developing countries. Most empirical evidence in this area originates from research in developed countries (Baines & Langfield-Smith, 2003; Burns, Ezzamel, & Scapens, 1999; Chenhall & Euske, 2007; DeLisi, 1990; Innes & Mitchell, 1990; Libby & Waterhouse, 1996; Lucas & Baroudi, 1994; J. A. Smith, Morris, & Ezzamel, 2005).

The next section presents the background and significance of the study, followed by the research question, research model and research design.

1.2   Background and Significance of the Study

The business environment in a developing country differs from that within a developed country with regards to market size, access to manufactured inputs, human capital, infrastructure, volatility and governance. According to Tybout (2000), although some developing economies are quite large, most are not; the menu of domestically produced intermediate inputs and capital equipment is often limited; a scarcity of technicians and scientists also affects flexibility in the production process and the ability to absorb new technologies; infrastructure is relatively limited; macroeconomic and relative price volatility is typically more extreme; legal systems and crime prevention are also relatively poor; and corruption is often a serious problem.

Malaysia is categorised as the developing country, however it has more advanced infrastructure and technology compared to most other developing countries. Malaysian manufacturing industries are also more concentrated than those of most developed countries (Bhattacharya, 2002). With globalization, the application of technology in Malaysia has increased, especially through foreign investment (Kassim et al., 2003). Changes in business environment in Malaysia arising from a market-oriented economy and government policies that provide businesses with the opportunity for growth and profits, have made Malaysia a highly competitive manufacturing and export base.

On the whole, manufacturing industries are the most active and important contributors to the Malaysian economy after the services sector. In 2006 the manufacturing sector contributed 31.1% of the total GDP, and 29.1% of total employment[1]. In addition, Malaysia's rapid move from a production-based economy (p-economy) towards a knowledge-based economy (k-economy) allows companies to do business in an environment that is geared towards information technology[2]. The advance of technology through ICT and computerization has also made management accounting information flow within organizations in this country more useful, timely, accurate, and relevant (Omar, Abd-Rahman, & Sulaiman, 2004).

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[1] Source: FMM directory 2008 Malaysian Industries.
[2] Source: Malaysia Industrial Development Authority (MIDA), http://www.mida.gov.my.

In developing countries, the manufacturing sector often receives preferential treatment from policy makers. According to Tybout (2000), most developing countries' government promote manufacturing with special tax concessions and relatively low tariff rates for importers of manufacturing machinery and equipment. It is also argued that government policies often favour large firms; even when policies do not explicitly favour large firms, these firms may enjoy *de facto* advantages, because sectors with large capital-intensive firms lobby the government more effectively (Tybout, 2000). Malaysia has industrialized rapidly in the last 20 years, and the confidence gained from this experience has led its leader to formulate Vision 2020 and k-economy. However, Malaysia's path to being an industrialized country has not been based on strong domestic producers but has instead relied on foreign multinationals to produce for export (Rasiah, 1995).

Based on the distinctive features of market size, access to manufactured inputs, human capital, infrastructure, volatility and governance, as discussed above, it can be concluded that the business environment in Malaysia is quite volatile from both regulatory and macroeconomic perspectives as compared to developed countries, especially Western countries like U.K., U.S. and Australia. Moreover, as organizations grow through expanding their range of products or services in response to more mature and saturated markets, they inevitably confront an increasingly hostile environment (Moores & Yuen, 2001). But, if there is substantial uncertainty about future demand conditions for these products, it often makes sense to choose production techniques that do not lock one into a specific technology; that is, to rely more heavily on labour (Tybout, 2000). This is because investment in fixed capital involves long-term commitments to particular products and production volume. Therefore, manufacturing firms in Malaysia may respond to the changes in environment in different ways than firms in those countries. Even though much research on management accounting and organizational change has been carried out in Western countries like U.K, U.S and Australia, because of these differences, empirical evidence obtained from research in these countries cannot necessarily be generalized to the Malaysian environment.

Moreover, the introduction of fast information technology within which firms in manufacturing industries in Malaysia operate has greatly affected the technological

environment. Much literature has identified technological advancement, active competitors and demanding customers as potential predictors of organizational and management accounting change (Baines & Langfield-Smith, 2003; Dibrell & Miller, 2002; Innes & Mitchell, 1990; Kaplan & Norton, 1996; Shields, 1997; Waweru, Hoque, & Uliana, 2004). This aspect is important because the management accounting system (MAS) requirement can vary significantly depending on how well known the causes of change in the external environment and their indicators are to the organization. This argument is supported by Waweru et al. (2004), who found that an increase in global competition and changes in technology were the two main contingent factors affecting management accounting change in South Africa. Apart from these external organizational factors, previous studies also found that contextual variable factors inside the organizations also have a connection to management accounting change. As suggested by Moores and Yuen (2001), support from strategies and structures are important to ensure a consistency in an organization. Strategy and structure have also been identified in the previous literature as the most important factors in management accounting change process. Thus, this study is conducted to further investigate these relationships.

Unlike developed countries, MAP in developing countries may be gained through "importing" management accounting systems in the manner adopted by foreign companies establishing operations in developing countries (Abdul-Rahman, Omar, & Taylor, 2002; Chow, Shields, & Wu, 1999). For example in Malaysia, local manufacturing companies are still using traditional methods compared to multinational corporations such as Japanese-owned companies, which mainly use new management accounting techniques (Abdul-Rahman et al., 2002). Furthermore, little research has been done in developing countries (see for example, Hoque & Hopper, 1994; Waweru et al., 2004) and even fewer studies in Asian countries like Malaysia (e.g., Abdul-Rahman, 1993; Nor-Aziah & Scapens, 2007). These factors provide further motivation to carry out this research in Malaysia so that it can contribute to a better understanding of the adoption of changes in organizational and MAS in a developing country context.

Further, this study attempts to provide incremental contributions to the management accounting change literature by explaining how organizations implement

management accounting innovations, or how redesign of their existing MAS can improve organizational performance[3] (Baines & Langfield-Smith, 2003; Chenhall, 2003; Hyvönen, 2007; Libby & Waterhouse, 1996; Mia & Clarke, 1999; Otley, 1980). Therefore, by looking into the performance implications of the possible alignment between change in MAS and organizational factors within environmental uncertainty, the findings of this study will make a significant contribution to management accounting theory and literature as well as providing guidance for decision makers, professionals and practitioners.

1.3   Research Question

In its broadest form, the proposed research will address this overall research question:

"How does the alignment of the management accounting system with organizational factors improve performance?"

In addressing this primary question, the study will concentrate on the influences of technology and the competitive business environment on MAP, organization structure, strategy and the impact of these changes on performance. More specifically, this study addresses the following research questions:

1.   What is the level of changes that have taken place in competitive environment, manufacturing technology, MAP, structure and strategy in Malaysian manufacturing companies?

2.   How do changes in the competitive business environment and manufacturing technology in Malaysia manufacturing companies influence the changes in MAP, organizational structure and strategy?

3.   In what ways do changes in MAP, organizational structure and strategy relate to each other and to what extent will these changes take place?

4.   What changes have been made to MAP in organizations facing changes in

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[3] Detail on this topic is discussed in the literature review chapter.

their configurations?

5.   In what ways do the alignment among MAS and other organizational factors influence performance?

1.4   Research Model

The literature review on management accounting and organizational change presented in Chapter Two suggests the basic framework as presented in Figure 1.1.
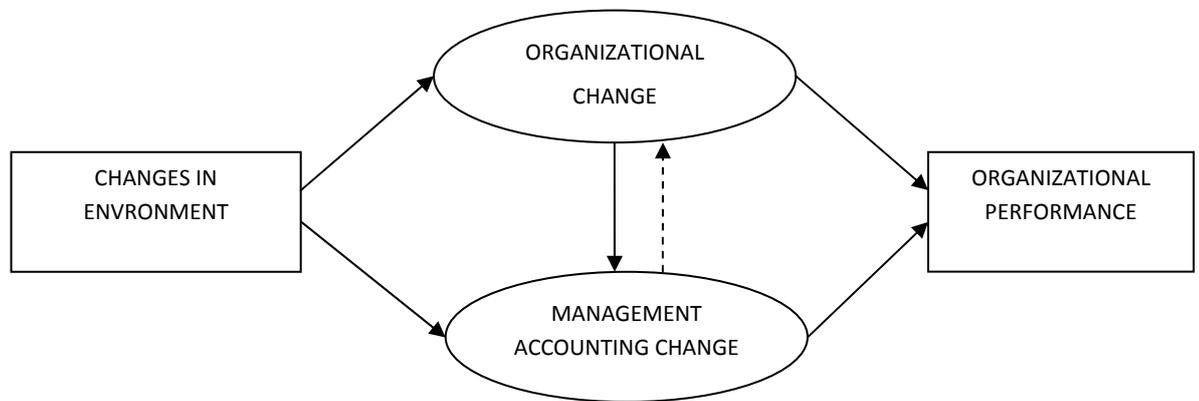
Figure 1.1

Basic Research Model

Taking into account different factors which influence organizational and management accounting change (as explained in Chapter 2), the basic model can be refined and developed to fit the current study by focusing on the specific environmental and organizational factors that can influence changes and performance of an organization, as follows:
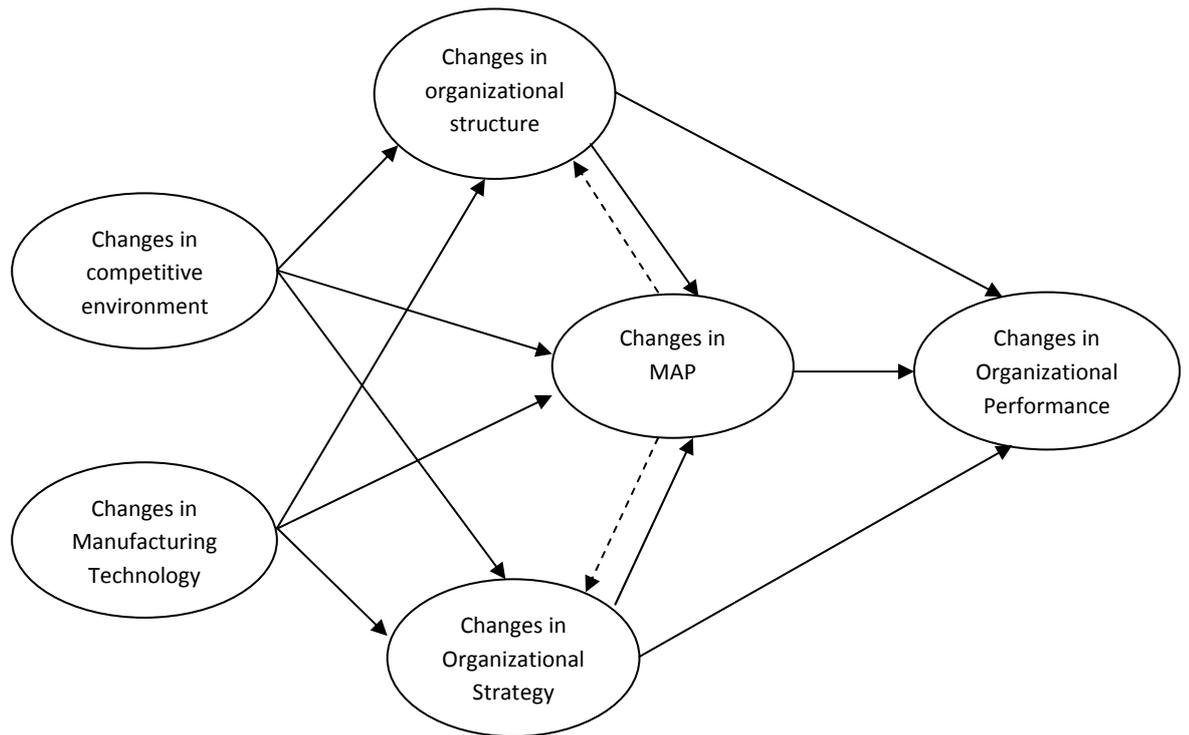
Figure 1.2

Conceptual Model

1.5   Study Design

A review on management accounting and organizational change literature shows some relatively neglected areas. For example the study by Baines and Langfield-Smith (2003) examined the relationships between the changing competitive environment, and a range of organizational variables as antecedents to management accounting change. However, their study was based on the assumption of unidirectional relationships between the variables. The literature review suggests that some relationships are in the opposite direction, or even have reciprocal or reverse causation, which will be further tested by this research. Some new relationships, not tested by Baines and Langfield-Smith (2003), will also be tested in this study: the cause of changes in competitive environment with management accounting practices, changes in technology on organizational strategy, changes in organizational structure on MAP and the impact of changes in management accounting practices, organizational structure and strategy on performance. Although Baines and

Langfield-Smith (2003) examined the relationships amongst competitive environment, technology, organizational design, advanced management accounting practice, and change in reliance on non-financial management accounting information, they only consider the direct relationship between greater reliance on non-financial management accounting information and organizational performance. They did not explore an interaction effect of this relationship on firm performance. A study by Mia and Clarke (1999) also only indicates the moderating role of the use of management accounting information on the relationship between the intensity of market competition and business unit performance, and not the effect on firm performance.

Based on the contingency fit argument, it can be argued that organizations are likely to perform effectively if they implement MAS that suit their organization's situational factors in an uncertain environment. This suggests a two-way interaction effect on firm performance between the change in MAS and organizational factors. Thus, a reverse causation relationship between MAP and organizational factors is tested in this study. In their study, Baines and Langfield-Smith (2003) also measured organizational change by means of managers' perception over a three-year period. However, it may take organizations more than three years to make substantial changes in investments in advanced manufacturing technology, or change their use of MAP, in response to changes in the competitive environment. This study provides a more detailed survey to capture the time lag between various organizational changes, which is five years.

Kober, Ng and Paul (2007) studied the interrelationship between management control systems and strategy in Australian organizations. Their analysis confirmed the existence of a two way relationship between management control systems and strategy, whereas, Chenhall and Langfield-Smith (1998b) examined how combinations of management techniques and MAP enhance the performance of organizations, under particular strategic priorities. This study extends these contributions by investigating how the alignment between MAP, organization's strategy and structure can improve performance. The extension adds several refinements to earlier studies, designed to add to the explanatory power of the prior research. Therefore, a theoretical advance in knowledge can be achieved.

Using both contingency and institutional theory, this study contributes to an elaboration of how the alignment of the MAS with organizational structure and strategy can contribute to performance improvement in manufacturing firms in Malaysia. Through providing a better understanding of these relationships, the study can help practitioners to make better decisions in the face of a changing environment, as well as helping the organization to overcome barriers to change. Moreover, it also contributes to the improvement in organizational performance and competitive advantage. Besides providing more helpful insights to practitioners, the theoretical framework developed and tested in this study contributes to the organizational and management accounting change literature.

This is an empirical research study. It is noted that few empirical research studies have been conducted on this topic (Baines & Langfield-Smith, 2003; Libby & Waterhouse, 1996; Sulaiman & Mitchell, 2005). Baines and Langfield-Smith (2003, p. 675) noted that "there has been limited empirical research examining the nature of the changes in MAS and organizational variables in response to environmental changes, and whether or not these changes improve performance." The current study represents an attempt to fill such an apparent gap in prior research.

This study used a mailed survey of manufacturing companies registered with the Federation of Malaysian Manufacturers (FMM). The selection of the manufacturing industry for this study was due to the fact that this industry is known to have rapid changes in technological and competitive environment. A survey questionnaire is used as the main method of data collection to examine how changes in competitive environment and advanced technology cause changes in organization's design, strategy and MAP, and how alignment among these variables impacts on performance. This is a causal study and it attempts to examine how one variable affects changes in other variables and how these variables are responsible for changes in organizational performance. The design of the questionnaire for the study will cover six major areas within the conceptual model and hypotheses, i.e. competitive environment, advanced manufacturing technology, MAP, organization structure, strategy, and performance.

The remainder of the thesis is organized as follows. Chapter 2 draws on previous research to identify the different dimensions of change, causal factors and change

process. The adoption of the survey research method and research instruments are explained and justified in Chapter 3, whereas the hypotheses for this study are elaborated in Chapter 4. The discussion of findings for the pilot test is provided in Chapter 5. Data analysis and hypotheses testing for this study are presented in Chapter 6. Finally, the detailed discussion of the findings is presented in Chapter 7, together with the conclusions and implications of the findings, its contribution to the body of knowledge in this area, limitations, and also some recommendations for future research.

CHAPTER TWO
LITERATURE REVIEW

2.1   Introduction

This chapter reviews the research literature on management accounting and organizational change. It provides the basis for the design of the research conducted both in terms of research methods used and the aspects of change upon the study. This chapter is divided into nine sections. The first section discusses management accounting and organizational change dimensions. This is followed by a discussion of management accounting change process, the external environment and technology, as well as a discussion of the relationship among competitive environment, technology, organizational and management accounting change. The final sections discuss aspects of performance with management accounting and organizational change, together with a summary.

2.2   Management Accounting and Its Evolution

The basic purpose of accounting information is to help users make decisions. Management accounting is branch of accounting that produces information for managers and forms an important integral part of the strategic process within an organization. It involves the process of identifying, measuring, accumulating,

analysing, preparing, interpreting, and communicating information that helps managers fulfil organizational objectives (Horngren, Sundem, Stratton, Burgstahler, & Schatzberg, 2007). Chartered Institute of Management Accountants (UK) views management accounting as an integral part of management which requires the identification, generation, presentation, interpretation and use of information relevant to:

- formulating business strategy;
- planning and controlling activities;
- decision-making;
- efficient resource usage;
- performance improvement and value enhancement.

Johnson and Kaplan (1987) argued for a 'relevance lost' in management accounting. They pointed the issue of inappropriateness of conventional management accounting techniques which offered little capacity for providing useful and timely information for better decision and control in the contemporary environment of rapid technological change and vigorous competition. Following Johnson and Kaplan (1987), management accounting techniques had rapidly developed for better decision-making and management control.

To promote a better understanding of the changes in management accounting practices, the International Federation of Accountants (IFAC) (1998) provides a framework explaining the development of management accounting. This framework explains the evolution in management accounting through four recognisable stages. As explained by Omar et al. (2004, p. 27), the primary focus of each stage are:

Stage 1 (prior 1950)

During this period, most companies were focusing on cost determination, which was related to stock valuation and the allocation of overheads. Some of the management accounting techniques that were developed for cost estimation were Last In First Out (LIFO) and First In First Out (FIFO). Cost estimation was justifiably emphasized because by estimating the cost, managers were able to control their financial position.

Stage 2 (1965-1985)

By 1965, companies had moved into generating information for the purpose of management planning and control. This was important because only valuable information could induce managers to make correct decisions. Management accounting techniques such as marginal costing and responsibility accounting were introduced during this stage to help managers to choose the correct course of action or create strategic business units respectively.

Stage 3 (1985-1995)

Increased global competition accompanied by rapid technological development in the early 1980s affected many aspects of the industrial sector. During this stage, the management focus remained on cost reduction, but more process analysis was made possible by cost management technologies. The aim was basically to reduce waste when processing the product because this could reduce the expenses incurred, thus increasing expected profit. Some of the techniques popularly practiced by companies at this stage include Just in Time (JIT) and Activity-Based Costing (ABC).

Stage 4 (1995 onwards)

In the 1990s world-wide industry continued to face considerable uncertainty and unprecedented advances in manufacturing technologies, which further increased and emphasised the challenge of global competition (Abdel-Kader & Luther, 2008). In this stage, companies focused on enhancing the creation of value through the effective use of resources. Basically, managers tried to identify factors of drivers that could potentially increase shareholder value. As such, non-value added activities were deliberately eliminated. Among the popular techniques introduced during this stage were Total Quality Management (TQM), Activity-Based Management (ABM), Benchmarking and Reengineering.

Even though the management accounting evolution can thus be distinguished into four stages, it is important to note that the techniques used in previous phases continued to be used in subsequent stages. This is consistent with a view that traditional and advanced management accounting practices tend to complement each other (Chenhall & Langfield-Smith, 1998b).

2.3   Management Accounting Change

Management accounting change is not a uniform phenomenon. Consequently one might expect the causal factors of change to be varied and this has indeed been confirmed by management accounting researchers. It is evident that both the external factors (environmental) and internal factors (relating to the organization concerned) have influenced the recent development of new management accounting systems and techniques. According to Shields (1997), the potential change drivers are competition, technologies, organizational design and strategies. These drivers of change also indicate the differing roles which causal factors can have in the process of change. Change in environment also implies uncertainty and risk which create a demand for further management accounting change in the form of 'non-financial' measures (Vaivio, 1999). Less attention has been given by researchers to the management accounting change process. Burns and Scapens (2000, p. 4) observed that, "little research attention has been given to understanding the processes through which new management accounting systems and practices have emerged (or failed to merge) through time".

Change can be addressed in a variety of dimensions. According to The American Heritage Dictionary, 4th Edition, change includes all of the following aspects: becoming different or undergo alteration; transformation or transition; going from one phase to another; making an exchange; modifying; substitution; giving and receiving reciprocally; replace with another; abandon. This definition illustrates different types of change and shows that, in general, it is not a uniform phenomenon. Wickramasinghe and Alawattage (2007) suggest change in management accounting as a learning methodology to understand how environmental factors shape internal process within organization. According to them, the process of change reflects on the question of how management accounting techniques emerged, evolved and were transformed when new demands from the changing environment are in place.

From a management accounting perspectives, different types of change can be researched upon. For example Sisaye (2003) study change with respect to the integration of Activity Based Costing (ABC) into strategy to manage organization's

operating activities. It is suggested that ABC can contribute to improve organizational performance if implemented as part of the overall organizational change strategy. Perera, McKinnon and Harrison (2003), examined changes in term of introduction, abandonment and reintroduction of transfer pricing in government trading enterprise as it moved from protected monopolistic status to commercialization.

Many researchers have shown an interest in understanding management accounting change (Baines & Langfield-Smith, 2003; Chenhall & Langfield-Smith, 1998b; Innes & Mitchell, 1990; Libby & Waterhouse, 1996). For example Chenhall and Langfield-Smith (1998b) have explored the benefit of management accounting change, but less is known about the forces that induce this change (Laitinen, 2006). The reasons for management accounting to change are termed "motivational factors" (Laitinen, 2006). Many researchers have suggested a substantial list of motivational factors (Baines & Langfield-Smith, 2003; Laitinen, 2001; Libby & Waterhouse, 1996). For example, Innes and Mitchell (1990) found a different set of circumstances linked with management accounting change, which they termed as follows:

- Motivators (e.g., competitive market, organizational structure, and product technology)
- Catalyst (e.g., poor financial performance, loss of market share, organizational change)
- Facilitators (e.g., accounting staff resources, degree of autonomy, accounting requirements)

The interaction between these variables promotes change not only in management accounting but also other related disciplines[4] (Innes & Mitchell, 1990; Laitinen, 2006). Laitinen (2001) classified these factors in six groups: information needs; changes in technology and environment; willingness to change; resources for change; objectives for change; and external requirements. Laitinen (2006), on the other hand, used four categories of factors to explain management accounting change: organizational factors; financial factors; motivational factors; management tools.

While, various factors have been associated with management accounting change,

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[4] For example in organizational study related to structure and strategy.

this study considers three factors, i.e., motivational factors, organizational factors and financial factors. Changes in environment and technology are used as motivational factors in explaining management accounting change and changes in organizational factors (i.e., structure and strategy). Besides that, organizational structure and strategy (organizational factors) are considered as contextual factors inside the firm that may have a connection to change in management accounting (Moores & Yuen, 2001). Financial factors are used as outcomes of management accounting and organizational change. Grandlund (2001) suggested that low financial performance may put economic pressure on the firm to change its MAS to increase performance. Baines and Langfield-Smith (2003) suggested that if management accounting change is accompanied with a greater reliance on accounting information, it may result in improved performance. Thus, financial performance may be an antecedent or an outcome factor of management accounting change.

Many firms have experienced significant changes in their business environment with advances in information technology, highly competitive environments, new management strategies, and a greater focus on quality and customer services. Many relevant management accounting studies have highlighted the significant changes in these operating environments (e.g., Burns & Vaivio, 2001; Choe, 2004; Gomes, Yasin, & Lisboa, 2007; Haldma & Laats, 2002; Hopwood, 1990; Hussain & Hoque, 2002; Innes & Mitchell, 1995; Kaplan & Norton, 1996; Libby & Waterhouse, 1996; Scapens, 1999; Vamosi, 2003) which have influenced the choice of which management accounting systems and techniques would be most effective (Waldron, 2005) and engendered the organization to reconsider its design and strategy (Baines & Langfield-Smith, 2003) in maintaining and/or improving performance (Chenhall & Langfield-Smith, 1998a; Choe, 2004).

Organizational change is a central issue within organizational theory, management and accounting. Hopwood (1987, p. 207) claimed that 'very little is known of the processes of accounting change'. This has provoked controversy over the theory of why and how changes are occurring. As argued by Quattrone and Hopper (2001, p. 404), 'what the concept of change means, whether it can be conceptualized independently from its process and how these factors relate to the practice of accounting is taken for granted and is poorly understood. Researchers have

commended various theoretical frameworks to explain these accounting changes, e.g. Gordon and Miller (1976) commend contingency theory whereas Burns and Scapens (2000) proffer old institutional economic theory (OIE). Contingency theory explained how changes in an environment surround organization causes changes in organizational factor as well as its accounting practice and decision making process. Whereas old institutional economic theory suggest how accounting and organization can change through the process of institutionalization.

Management accounting research has used a variety of theoretical frameworks to explain the changes. This study uses both contingency and institutional theory to explain a need for a good fit between the MAS, external environment and organizational aspects, to improve performance. This is similar to other studies on management accounting and organizational change which also use contingency theory (for example, Baines & Langfield-Smith, 2003; Haldma & Laats, 2002; Hyvönen, 2007). The following sub-sections summarise the process of management accounting change from each perspective.

2.3.1   Contingency Theory

Contingency theory is paramount to explain how accounting systems might be affected by the fit between environmental and organizational factors. Central to the contingency approach in examining these relationships is the notion of fitness. Contingency is defined by the Oxford dictionary as:

> *"The relationship between behaviour and the consequences that is dependent on that behaviour".*

Contingency theory posits that an appropriate match between organizational characteristics to contingencies will improve organizational effectiveness (Morton & Hu, 2008). Donaldson (2001, p. 7) defined "Contingency" as "any variable that moderates the effect of organizational characteristics on organizational performance".

In the contingency theory of organizations, there is no universally acceptable model of the organization that explains the diversity of organizational systems design. Gordon and Miller (1976) suggested the usefulness of contingency theory for developing effective management accounting systems. Gordon and Miller (1976) proposed that the design of accounting information systems should be dependent on firm-specific contingencies where environmental, organizational and decision style variables could contribute to understanding such systems (see Figure 2.1).
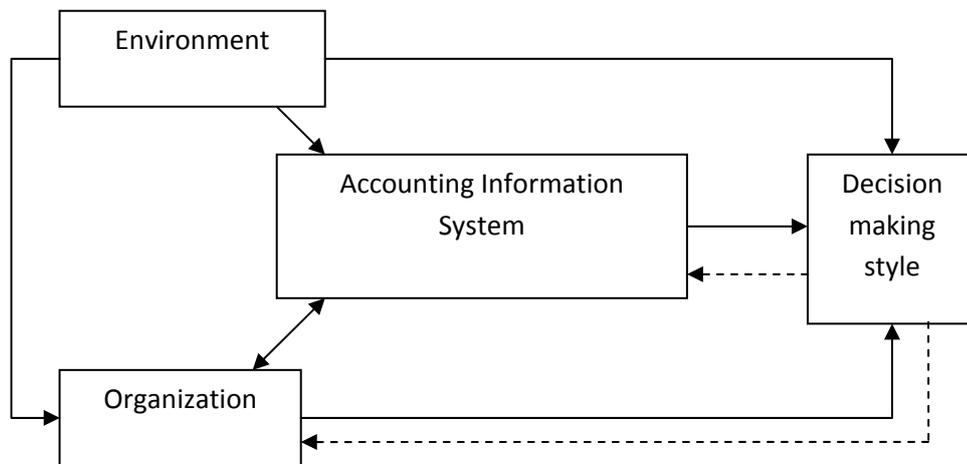
Figure 2.1

Gordon & Miller's Framework

Gordon and Miller (1976) also suggested operational measures for each component of the model. The environmental measures include dynamism, heterogeneity and degree of differentiation, bureaucratization, available resources, and integration through committees, rules or policies.

A contingency perspective suggests that effective management accounting systems should align with both internal and external factors. Depending on the match between management accounting system characteristics and these various factors affecting the organization, different levels of effectiveness might be witnessed. Waterhouse and Tiessen (1978) expanded the organizational context to include both environmental and technological factors, while Simons (1987) incorporated business strategy into these measures.

The identification of contextual variables in this study is traced from the original structural contingency frameworks developed within organizational theory. Early accounting researchers focused on the impact of environment and technology on organizational structure (Otley, 1980; Waterhouse & Tiessen, 1978). According to Chenhall (2007), a new research stream is related to the role of strategy. It has been incorporated in the traditional organizational model which suggests important links with environment, technology, organizational structure and MCS.

Over the last few decades, a number of innovative management accounting techniques have been developed. This innovation is needed to support modern technologies and new management process. As noted by Abdel-Kader and Luther (2008, p. 3), "the new techniques have affected the whole process of management accounting (planning, controlling, decision making and communication) and have shifted its focus from a 'simple' role of cost determination and financial control, to a 'sophisticated' role of creating value through the deployment of resources". It also has been argued that these 'new' accounting techniques are important in the search for a competitive advantage to meet the challenge of global competition. Thus, to adapt to these technological development and competitive environment, firms must design a MAS that is congruent with the new requirements (Gerdin, 2005). However, it is also noted that few organizations have adopted these new techniques. As cited by Abdel-Kader and Luther (2008), Tillema (2005) explain the appropriateness of using advanced techniques is dependent on the circumstances in which these techniques are being used and this gives rise to the need for a contingency theory perspective.

Many researchers suggest that an appropriate accounting system depends upon organizational contextual variables (Gordon & Miller, 1976; Otley, 1980; Waterhouse & Tiessen, 1978). For example, Otley (1980) proposed the need to identify specific aspects of an accounting system associated with certain defined circumstances and demonstrate an appropriate matching. The contingency approach to management accounting is based on the premise that, there is no universally appropriate MAS that applies equally to all organizations in all circumstances (Waterhouse & Tiessen, 1978). Thus, the complex relationship between MAS, its contextual variables and its impact on organizational performance has attracted

numerous researchers to investigate this issue (Baines & Langfield-Smith, 2003; Jermias & Gani, 2002; Laitinen, 2006). Figure 2.2 shows a simplified contingency model by Weill and Olson (1989) which could be used to explain this contingent relationship.

Drawing upon a structural contingency theory of management accounting, this study examines how technology and environmental factors determine the degree of changes in MAS and organizational factors (strategy and structure). Further, this study examines whether firm performance is contingent on the alignment of management accounting change with the organizational factor in technological development and competitive environment.
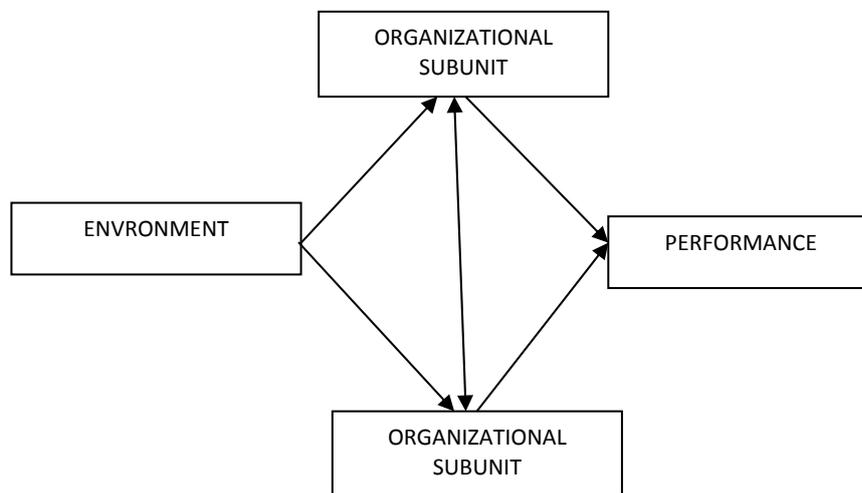
Figure 2.2
A Simplified Model of Contingency Theory
in Organizational Research

2.3.2   Institutional Perspectives

Institutional theory is an adaptive change process framework. It examines the impact of external environment factors and market conditions on organizational change and development (Barnett & Caroll, 1995). Using institutional theory, Burns and Scapens (2000) have conceptualized management accounting change as change in organizational rules and routines. Under old institutional economic (OIE) theory, management accounting is conceived as a routine, and potentially institutionalized,

organizational practice. By being institutionalized, management accounting practices can both shape and be shaped by institutions which govern organizational activity. Within OIE theory, institution is defined as:

> *"a way of thought or action of some prevalence and permanence, which is embedded in the habits of a group or the customs of a people"* (Burns & Scapens, 2000, p.5).

In OIE there are three dichotomies which offer insights into the process of management accounting change. They are: (1) formal versus informal change; revolutionary versus evolutionary change; and (3) regressive versus progressive change (Burns & Scapens, 2000). The formal versus informal change dichotomy will be used in this study as it is the most appropriate for explaining the reciprocal relationship between management accounting and organizational change. Formal and informal management accounting change is used to imply that change is not specifically directed (formal change), but may evolve out of the intended actions of the individuals who are enacting and reproducing organizational routines (informal change). In this study, organizational routines are referred to as organizational structure and strategy. On the other hand, the other two dichotomies, i.e., revolutionary versus evolutionary change, and regressive versus progressive change, involve a disruption to existing routines and institutions, and focus on a value system in management accounting changes process, which will not be examined in this study.

Formal change occurs through the introduction of new management accounting systems and techniques, which in turn, engender the organization to change. In contrast, informal change occurs when change in an organization's operation condition (i.e. organizational activity such as ownership structure or production technology) creates the need for change in management accounting practice. Hassan (2005) provides evidence on formal change. He shows how management accounting is acted upon to disrupt the hospital's micro institutions and routines, challenge physicians' professional and bureaucratic power and therefore bring change to a public hospital. J. A. Smith et al. (2005) show the occurrence of informal change where, organizational change, as effected by the use of outsourcing, causes specific changes to take place in the organizations' management accounting systems. Both

findings provide evidence of a reciprocal relationship between management accounting and organizational change, where change in management accounting practices can influence the organization to change (formal change) and change in organizational activity also can influence management accounting practices to change (informal change).

The management of change suggests how management accounting change is intertwined with a changing organizational design and strategy; these have been the most consistently used organization characteristic and variable in past research (e.g., Chenhall, 2003; Lapsley & Pallot, 2000). According to Sisaye (2003), the institutional approach to organizational change which suggests that organizational structures, that affect an organization's learning strategy and ability to adapt changes in the external environment, provide the context for at least two types of organizational change strategies: gradual-incremental and revolutionary-radical. In this case, the institutional framework maintains the view that organizations irrespective of their structural arrangements, can successfully change if they implement adaptive strategies of either incremental or radical change to bring about process innovation changes. Ma and Tayles (2009) in their case study of the emergence of strategic management accounting is also used institutional framework to interpret the external and internal influences on the change in management accounting techniques in their studied organization.

2.4   Changes in Competitive Environment and Advanced Manufacturing Technology

Environment can be broadly characterized as phenomena that are external to the organization and which have either potential or actual influence on the organization (Macy & Arunachalam, 1995, p.67). The external environment may thus relate to technology, law, politics, economics, culture and demographics. According to Chenhall (2007, p. 172), environment refers to " particular attributes such as intense price competition from existing or potential competitors". Uncertain environment, which is impacted from high competition, is an important contextual variable in contingency-based research.

Globalization has changed external environmental factors in developing countries, which in turn affect the internal operations of organizations as well as their management accounting practices. This relationship is explained using contingent theoretic arguments that changes in management accounting practices and internal operations of organizations are contingent on the "fit" with changes in the external environment that surrounds them (for a review, see Abdel-Kader & Luther, 2008; Haldma & Laats, 2002; Macy & Arunachalam, 1995). Competitive environment and technology advancement have generally been assumed in the literature, to influence the manufacturing company to change its management accounting practices, as well as its organizational design and strategies. However, there is little empirical research to support such relationships and little, if any, research has been conducted in the context of developing countries.

This study investigates how the alignment between the adoptions of management accounting practices with organizational structure and strategy in a competitive environment with advanced technology, influence performance. As compared to a developed country, Malaysia is categorized as an 'uncertain' country, with rapid pace of change and which has the opportunity for economic growth. Fluctuating interest rates, inflation, exchange rate and stock exchange indices, are evidence of a business environment in Malaysia which is volatile. Increased economic uncertainty is an important cause of changes in management accounting practices[5] (Luther & Longden, 2001). Mia and Clarke (1999) found a positive relationship between the intensity of market competition and the usefulness of management accounting information.

The pressure of management accounting and organizational change may come from the environment of the firm. The most obvious environmental factor is market competition (Hoque, Mia, & Alam, 2001; Libby & Waterhouse, 1996; Mia & Clarke, 1999). Literature has identified that organizations which operate in competitive business environment tend to change their management accounting practices, organizational structures and strategy in order to succeed (e.g., Baines & Langfield-Smith, 2003; Chenhall & Morris, 1986; Chong & Chong, 1997; Libby &

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[5] Luther and Longden found that the mean response to the importance of increased uncertainty of the economic environment as a cause of changing management accounting practices in South Africa (high economic uncertainty) is higher than in the UK (more certain economic).

Waterhouse, 1996; Luther & Longden, 2001; Mia & Clarke, 1999; Pratt, 2004; Waweru et al., 2004). For example, Luther and Longden (2001) found evidence that the organization's ability to sell abroad and to compete against imports changed managerial and business practices, forcing change in management accounting.

Technology also becomes an important aspect of management accounting and organization research drawing on the manufacturing sector. Previously, issues concerning the role of MAS within advanced manufacturing settings such as Just-In-Time (JIT), Total Quality Management (TQM) and Flexible Manufacturing (FM) have been explored. According to Emmanuel, Otley and Merchant (1990), technological contingency factors include the nature of the production process, its degree of routine, how well means-end relationships are understood and the amount of task variety.

It has been evident that new technology will lead to a change in cost structure (Haldma & Laats, 2002). Since manufacturing technology becomes more advance, the MAS also becomes more complex and sophisticated to cope precisely with the manufacturing process. Tight global competition associated with advanced manufacturing technologies has prompted the need for better cost management which can be achieved by adopting appropriate MAS. But the adoption of appropriate MAS alone is not enough in order for the firm to remain competitive; manufacturing technologies need also to be consistent with business strategy and organizational structure. Thus, an appropriate fit between technologies, MAS, strategy and structure helps to build a competitive advantage, thereby enhancing organizational performance (Hyvönen, 2007).

Hypotheses are formulated in this study using the contingent theoretic arguments that changes in management accounting practices and internal organizational factors are contingent on the "fit" with changes in the external environment. Contingency-based studies have examined MCS as both dependent and independent variables. Good fit means enhanced performance, while poor fit implies diminished performance (Chenhall, 2007). This study also use an old institutional economic (OIE) theory perspective, to explain the reverse causation relationship between organizational and management accounting change (known as formal and informal change).

2.5   Competitive Environment, Technology and Organizational Change

An organization is often interpreted as a configuration of different characteristics. Numerous dimensions of external context (such as environments, industries and technologies) and internal organizational characteristics (such as strategies, structures, cultures, processes, practices and outcomes) have been said to cluster into configurations. According to Moores and Yuen (2001) organizational configurations are sets of organizations that share a common profile with respect to key characteristics such as strategy, structure and the decision making process. In most configurational research, the focus is on the link between organizational configuration and performance (Cadez & Guilding, 2008a). In configurational theory, organizational performance is expected to be positively affected by the selection of strategic choice and structural design that fits the chosen strategy (Cadez & Guilding, 2008a).

In the changing environment, markets have become more competitive, mainly in respect to an increased level of quality and competitively priced products. Organization may respond to these changes by reorganizing their work processes through adopting organizational design and strategy that have stronger customer orientation. In order to compete, many organizations made considerable investments in advanced manufacturing technology such as computer-integrated manufacturing and just in time systems (Baines & Langfield-Smith, 2003), which in turn can increase quality, productivity and flexibility as well as reduce cost.

The institutional approach to organizational change suggests that organizational structures affect an organization's learning strategy and ability to adapt to changes in the external environment. It suggests that the organization structural arrangement can successfully change if they implement either incremental or radical adaptive strategic change (Sisaye, 2003). Theorists of revolutionary change have advocated that all organizational elements such as strategy, structures, people, systems, and culture, have to be changed simultaneously to achieve maximum organizational alignment and effectiveness (Huy, 2001).

2.5.1 Organizational Structure

In contemporary competitive settings, organizations are increasingly concentrating on factors that provide value to the customer (Cadez & Guilding, 2008a; Perera, Harrison, & Poole, 1997). This customer-focus is triggering a flattening of organizational structures. According to Chenhall (2008) the term "horizontal organization" has evolved to reflect practices applied in companies that integrate activities across the value-chain to support a customer-focus strategy. In horizontal organizations, decisions are made by cross-functional management teams, including management accountants (Baines & Langfield-Smith, 2003; Naranjo-Gil & Hartmann, 2007; Scott & Tiessen, 1999).

Organizations are seen as having to deal with physical environments that are changing more rapidly than the organizations themselves. Consequently, the pressure on organizations to adapt and change their structures is immense (Schwarz & Shulman, 2007). Organizational structures address the organization of work activities, including both personnel and production systems. These structures can be described along either functional or divisional dimensions, such as, management controls, levels of hierarchy, decentralization, complexity of job tasks, degree of functional specialization, and extent of departmentalization, which will vary according to the organization's size (Sisaye, 2003).

Structural change is offered as a means to help the organization evolve. This transition is stimulated by rapid environmental change, increasing complexity and uncertainty and the predominance of loosely coupled organizational components (Schwarz & Shulman, 2007). The contingency theory literature indicates that factors such as technology and the environment affect the design and functioning of the organization. The past decade has also seen the development of several models of technology-enabled structural change (Dibrell & Miller, 2002). According to Khandwalla (1974), adopting new technologies may require changes in organizational structures and work processes to better suit the capabilities of improved technology. Thus, for better success, there is a need for a change to organizational structure fostered by advanced technology applications.

Organizational design/structure represents the patterns and relationships that exist

among organization or work unit elements (Macy & Arunachalam, 1995, p.69). A change in structure can be in the form of new organization structural, de-departmentalization, centralization, decentralization and size (see, Burns & Scapens, 2000; J. A. Smith et al., 2005; Waweru et al., 2004). In Schwarz and Shulman (2007), Scott (2005, p.468) emphasis that "organization structures are the product not only of coordinative demands imposed by complex technologies, but also of rationalized norms legitimizing adoption of appropriate structural models".

With globalization, markets have become more competitive and the introduction of fast information technology has greatly affected the technological environment within which firms in developing countries operate. Particularly, with an increased level of high quality, competitively priced product, and use of advanced manufacturing technology, like computer aided manufacturing and just-in-time production, firms may respond to reorganizing their work processes by adopting structures that have stronger customer orientation (Baines & Langfield-Smith, 2003; Dibrell & Miller, 2002; Keidal, 1994). In particular, a variety of team-based structures has emerged, including self-managed work teams, and cross-functional project teams (Cohen & Bailey, 1997). The adoption of teams is associated with flatter hierarchies and the increased empowerment of lower-level managers and employees (Chenhall & Langfield-Smith, 1998b; Shields, 1997). To ensure fast and innovative responses in complex and dynamic environments, there has been a move away from hierarchical controls and centralized decision making, towards the allocation of more responsibility to lower levels of the firm.

The development of several models of competitive environment and advanced technology with structural change can be seen from previous research (Baines & Langfield-Smith, 2003; Dibrell & Miller, 2002; Lucas & Baroudi, 1994; Pitts, 1980; Subramaniam & Mia, 2001). For example, Subramaniam and Mia (2001) suggest that in a competitive environment, organizational commitment through managers' value orientation towards innovations is influenced by increased decentralization. Baines and Langfield-Smith (2003) show an indirect effect of competitive environment on organization design, where the change in this organizational factor appears to be a response to the change in strategy, which later resulted in changes in organizational design. Some past studies had shown that competitive environment

and advancement in technology have directly affected organization design, where as some other studies show indirect effects on organizational design.

Adopting new technologies may require changes in organizational structures and work practices to better suit the capabilities of that technology. Dibrell and Miller (2002), and Lucas and Baroudi (1994) suggest that advances in technology have enabled managers to adapt existing forms and create new models for organizational design that better fit the requirements of an unstable environment. The successful implementation of information technology and computer networks in an organization as well as the use of high degree automation and computer aided technology in production systems (Choe, 2004; DeLisi, 1990; Harris, 1996), often require the blending of technological and social skills, which can be best achieved through the adoption of work-based teams or production cells. Dibrell and Miller (2002) established that information technology has been a catalyst in the development of new forms of organizational design, where these new structures emphasize products and customers rather than mass production. A team may manage the complete processing of products, with each employee performing several functions. Thus, it is argued that the use of team-based structures in a competitive environment, together with greater use of advanced technology, enables organizations not only to improve their speed and flexibility of response, but also to improve the quality of that response.

2.5.2 Organizational strategy

Since the middle 1980's, there has been growing interest in researching the way that manufacturing strategies can be used to gain competitive advantage (Langfield-Smith, 1997). The dynamic nature of competition is intensifying due to the increasing speed of knowledge, and is developed through information technology. As a result, strategy development has had to change from a process of conception to a process of learning (Feurer & Chaharbaghi, 1995). The strategy an organization adopts constitutes the logic underlying its interactions with its environment. According to Sisaye (2003), the strategy the organizations are likely to choose depends on the nature of the environmental factors and the organizational change/

learning strategies and the degree to which organizations define their problems are related to the type of learning strategy. As cited in Macy and Arunachalam (1995), Chandler (1962, p.13) defines strategy as,

> *"the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals."*

Hambrick (1980, p. 567) views strategy "as a pattern of important decision that guides the organization in its relationship with its environment; affects the internal structure and processes of organization; and centrally affects the organization's performance". This study focuses on how firms use business strategy in a competitive market to improve performance. In order to understand the strategic choice process, it is important to add to our understanding a different type of strategy typologies. A consideration should be made of the way firms' position themselves within their environment by way of competitive strategy. This involves the identification of a firms' strategic orientation and how this affects the way in which MAS are developed and used. Notions of strategic orientation have been derived from previous studies.

Miles and Snow (1978) developed four types of strategy typologies: prospector, defender, analyser and reactor, whereas, Porter (1980) proposed two different type of strategy, i.e., low cost strategy and product differentiation strategy. The typology developed by Miles and Snow (1978) is based on how companies respond to a changing environment and align environment with their companies. These generic strategies are explained as:

- *Defenders* – Firms with a narrow business scope. Top managers are highly expert in their company's limited area of operation but tend not to search outside their domains for few opportunities. Consequently they seldom need to make major adjustments in their methods of operations and their structure. They devote primary attention to improving the efficiency of their existing operations. Defenders operate in relatively stable product areas, offer more limited products than competitors and compete through cost leadership, quality and service. They engage in little product/market development.

- *Prospectors* – Firms that almost continually search for market opportunities and they regularly experiment with potential responses to emerging environmental trends. Because of their strong concern for product and market innovation, they are sometimes not totally efficient. Prospectors compete through new products and market development. Product lines change over time and this type of company is constantly seeking new market opportunities.
- *Analyser* – Firms that operate in two types of product-market domain, one relatively stable, the other changing. In their stable areas, these companies operate routinely and efficiently through the use of formalised structures and processes. In the turbulent areas, top managers watch their competitors closely for new ideas and then rapidly adopt those that appear to be the most promising.
- *Reactors* – Firms in which the top management frequently perceives change and uncertainty occurring in their organizational environments but is unable to respond effectively. Because these firms lack a consistent strategy-structure relationship, they seldom make adjustments of any sort until environmental pressure forces them to do so.

However, there have been debates regarding which one of these typologies best represents holistic configurations of organizational factors. As cited by Cadez and Guilding (2008b, p. 3), "Olson et al (2005) feel that the Miles and Snow's typology is limited due to its internal focus and proposed a hybrid model that represents a synthesis with Porter's low cost vs. differentiation typology". However, according to Govindarajan and Gupta (1985) the prospector and defender classifications of Miles and Snow closely parallel with Porter's differentiation and cost leadership strategies. Empirical evidence indicates that strategies of defend/ cost leadership do not require sophisticated information systems, while those of prospect/product differentiate do (Chenhall, 2003; Langfield-Smith, 1997)

Increasing globalization has resulted in intense and aggressive competition, increased customer demands and shorter product life cycles (Shields, 1997). A proper link between strategy and manufacturing operations is the key to developing sustainable competitive advantage (Porter, 1996). One way in which organizations' can respond to increasing customer demands of quality, flexibility and dependability of supply is through the implementation of advanced information and manufacturing technology.

The competitive environment requires that firm's are able to create value for their customers and to differentiate themselves from their competitors through the formulation of a clear business strategy (Simons, 1987). However, it is also argued that to achieve competitive advantage, a clear business strategy itself is not sufficient. It must be supported with appropriate organizational factors such as effective manufacturing technology, organizational design and accounting information systems (Jermias & Gani, 2002)

The organization should change its strategy to accommodate the change in environment factors. Several researchers have established that an organization's strategy is set up in response to its competitive environment, and the appropriate matching of strategy and the environment can enhance performance (Baines & Langfield-Smith, 2003; Chenhall & Langfield-Smith, 2003). According to Davenport (2000), organizations that do not have their information systems aligned with their strategic objectives are less successful than organizations that have aligned their information technology and strategy.

Several empirical researches have also studied the linkage between competitive environment, advanced technology and strategy. For example, Baines and Langfield-Smith (2003), Chenhall and Langfield-Smith (2003), Harris (1996), and DeLisi (1990) show that firms facing a more competitive environment and technology advancement will change towards differentiation strategy. Fuschs, Mifflin, Miller and Whitney (2000) found that successful firms aligned key elements of strategy with the environment. On the other hand, Baines and Langfield-Smith (2003) confirmed that the relationship between changes leading to a more competitive environment and changes towards a differentiation strategy were particularly strong, reflecting environmental change as a driver of strategic change. Baines and Langfield-Smith (2003) also show a significant relationship between changes in strategy and changes in advance manufacturing technology.

As the environment becomes dominated by increasingly more demanding customers and as competitors respond to customer demands in increasingly sophisticated ways, a firm may place emphasis on developing differentiation strategy that emphasize more customer-oriented aspects such as quality, flexibility, innovative products and dependability of supply (Perera et al., 1997). DeLisi (1990), suggests that, in order to

enhance competitive advantage, strategy should be changed by employing advanced information technology. Schroeder and Congden (2000), in a study of small to medium-sized manufacturers, found the most financially successful firms were those which demonstrated a tight alignment between strategy and technology, while Kotha and Swamidass (2000) found that for firms competing on the basis of quality, customer service, delivery reliability, product features and flexibility, investment in advanced manufacturing technology resulted in superior growth.

2.6   Competitive environments, technology and management accounting practices

Previous literature suggests that changes in environmental factors surrounding an organization can have a significant impact on its accounting and control systems (Baines & Langfield-Smith, 2003; Hoque & James, 2000; Innes & Mitchell, 1995; Libby & Waterhouse, 1996; Scapens, 1999; J. A. Smith et al., 2005; Waweru et al., 2004). For example Waweru et al. (2004) had identified factors which facilitate change in their studied organizations as competition, technology, new shareholders, new customers, new accountants, and poor financial performance. Market competition and technology advancement have been identified as a major trigger for management accounting change (Baines & Langfield-Smith, 2003; Libby & Waterhouse, 1996; Waweru et al., 2004). This is based on the argument that with an increase in uncertain environments, managers need specific forms of management accounting information to support their decision needs and to assist them to monitor progress against strategies. This argument is supported with previous contingency-style management accounting research which suggested that an appropriate fit with the environment and organizational system is needed to support managers' new information requirements (see for example, Chenhall, 2003; Gerdin & Greve, 2004; Haldma & Laats, 2002; Lapsley & Pallot, 2000; Waweru et al., 2004). Gordon and Miller (1976) was among the first to encourage this line of contingency-based inquiry when it posited that MAS are associated with environmental, organizational and decision-making style factors. The adoption of changes in management accounting practice is expected to be high for firms operating in advanced information technology and competitive contexts where understanding costs and

measuring performance are keys to survival.

In response to the changes in competitive environment and advancement in technology, most previous management accounting change research studied changes in advance management accounting techniques such as activity based costing (ABC) and total quality management (TQM) (e.g, Abdul-Aziz, Chan, & Metcalfe, 2000; Chenhall, 1997; Choe, 2004; Innes & Mitchell, 1995; Kaynak & Hartley, 2006; Sisaye, 2003; Soin, Seal, & Cullen, 2002). Few studies examined the changes in traditional management accounting techniques such as budgetary controls, standard costing and cost-volume-profit analysis (e.g., Abernethy & Brownell, 1999; Libby & Waterhouse, 1996; Waweru et al., 2004).

The efficient and effective management accounting and control system (MACS) is vital to an organization's survival; this is evident with the increased focus on quality and better customer service by firms wishing to retain competitiveness. To remain competitive, the organizations need to monitor a diverse range of competition factors such as competition for price and market share, marketing and product competition, number of competitors, and competitors' actions, which can be achieved through the use of MAS that tracks both financial and non-financial performance (Baines & Langfield-Smith, 2003; Hoque et al., 2001). Haldma and Laats (2002) examined the influence of external environment, technology and organizational aspects on MAS change within an Estonian company. They found that increasing competition and change in market structure have affected the MAS and the use of AMT is associated with tightening global competition and increasing fixed cost.

It is argued that with the introduction of new technologies in manufacturing operations, the structure of manufacturing costs has changed. Thus, it requires MAS to be designed to support, not restrict, the drive for excellence. In the new environment many firms found their traditional cost accounting measures were inhibiting the introduction of innovative processes and technologies (Abdel-Kader & Luther, 2008). The contemporary manufacturing environment focuses on improved production technology through computer-aided design (CAD), computer-aided manufacturing (CAM), robotics and efficient operating systems (Askarany & Smith, 2008). These innovations have implications for business operations including MAS. Technology has become an interesting topic for research, especially in identifying its

effect on MAS (Askarany & Smith, 2008; Baines & Langfield-Smith, 2003; Hoque et al., 2001).

According to Baines and Langfield-Smith (2003), organizations that adopt new and more advanced manufacturing technologies need to change their MAS to better align them to adopted technology, to facilitate operations, and to be more successful. However, Baines and Langfield-Smith (2003) found no significant relationship between advanced manufacturing technology and advanced management accounting practices. It has been also suggested that a firm with a fully automated production environment requires a different kind of MACS such as ABC (Hoque, 2000). Thus, traditional systems itself cannot effectively help managers to manage resources as well as identifying relevant cost. Choe (2004) from his study on Korean manufacturing firms, found a significant positive relationship between the level of advanced manufacturing technology and the amount of information produced by the management accounting information system. Thus, it can be concluded that competitive environment and technological developments in organizations are likely to have a positive influence on MAS change.

2.7   Management Accounting and Organizational Change

Contingency researchers have argued that MAS and control systems, structures and processes are influenced by environmental uncertainty, production technology and strategy. There are various organizational factors that describe those contextual variable factors inside and outside the firm and which may have a connection to management accounting change (Laitinen, 2006; Moores & Yuen, 2001). These contextual variables such as uncertainty, strategy, structure, firm size, production technology, organizational capacity and intensity of competition are linked to management accounting change (Laitinen, 2001; Libby & Waterhouse, 1996; Simons, 1987).

These factors can be broadly classified into environmental and internal factors (Laitinen, 2006). A detailed discussion on environmental factors had been presented previously, but we still need to evaluate the interrelationship between management accounting change and internal factors, i.e., structure and strategy. While previous

studies have added to our understanding of the interrelationship between contextual variables and management accounting change, few, if any, contingency studies have successfully developed and measured the construct of "appropriate match" between them. Moores and Mula (1993) suggest that the designers of MAS consider both the strategy pursued and structure adopted before providing information for decision makers, to ensure organizational effectiveness. Several empirical studies have tested the contingent relationship among MAS, organization structure and strategy, and have found a proper match among them (e.g., Baines & Langfield-Smith, 2003; Chenhall & Langfield-Smith, 1998b; Moores & Yuen, 2001). However, no study known to the author, investigates the interrelationship among these variables.

The role of a management accounting system is to provide up-to-date information to help managers reach informed economic decisions, and to motivate users to aim and strive for organizational change (Horngren, 1995). Failure to rely on appropriate accounting information may contribute to ineffective resource management and a gradual decline in organizational performance. According to Omar, et al. (2004) the integration of traditional with new management accounting techniques could result in more effective management accounting systems. Such an integrated phenomenon is very commonly practiced by Japanese companies worldwide, including in Malaysia. In contrast with foreign companies, it is found that local manufacturing companies in Malaysia are still largely employing traditional management accounting systems to meet their need for both internal and external reporting purposes (Omar et al., 2004).

Another view suggests that comparing traditional and advanced management accounting practices requires a more holistic view as both sets of practices tend to complement each other (Chenhall & Langfield-Smith, 1998b). This is explained by IFAC's evolution of management accounting, where the traditional techniques developed in the early stage are continuously used in later stages. Calls for the development of strategic management accounting are based on the perception that traditional systems are inadequate in providing information to assist in developing manufacturing strategies that enable the firm to compete on quality, reliable delivery, flexibility as well as low cost (Moores & Mula, 1993). Thus, the issue of whether advanced management accounting practices should be used to complement or substitute for traditional management accounting practices in a changing

environment is still not settled. As noted by Chenhall and Langfield-Smith (1998b, p. 257) "... contextual factors such as manufacturing technology (for example, robotics and automation) and product diversity may affect the potential usefulness of traditional management accounting practices. Clearly, the impact ... of combining traditional and contemporary management accounting practices could be considered in future research". Further evidence on this issue might result from this study.

Despite the unsettled issue of types of change in management accounting techniques, change in an organization's environment imposes other demands on MAS, including the necessity of making suitable changes to maintain effectiveness. The effectiveness of using MAS as a platform for change can be explained by considering the extent to which the organization develops temporal capacity that is required to manage the alignment of different modes of change (Chenhall & Euske, 2007). Burns et al. (1999) argued that changes in management accounting practices are not necessarily confined to the introduction of new systems (replacement of the existing system); changes can be in the way management accounting is used (output or operational modification).

Sulaiman and Mitchell (2005) explored the forms which management accounting change can take by utilizing a simple typology of MAS change derived from existing research literature. They found it to consist of addition, replacement, output modification, operational modification and reduction. They found that replacement of existing techniques and information output modifications are particularly significant as these types of change have both a relatively high frequency and importance.

Management accounting change ranged from comprehensive a costing system to tentative, partial and temporary change of a more modificatory type (see, Anderson & Young, 2001; Innes & Mitchell, 1990). The classification of management accounting change has also been studied by several researchers. For example, Vaivio (1999) provide instances of change involving the supplementation of information in existing performance measurement packages, whereas Granlund (2001) observed the replacement of management decision support system with new techniques.

2.7.1 Management accounting and structural change

Organizational structure is one of the primary factors in establishing the overall control system within an organization, so that the activities of the organization can be carried out. According to Moores and Mula (1993), MAS forms an important part of the information and control systems that reinforce and support the basic intent of the formal structure. They reported that findings from previous research show that large and technical sophisticated firms were associated with administrative control strategies defined by decentralisation and structuring with a strong emphasis on MAS. Whereas, small and dependent firms were associated with interpersonal control strategies (described by centralisation and lack of autonomy; organic structure with future oriented information; and decentralisation with perceived usefulness of aggregated and integrated information). It is also suggested that when the firm is confronted by high uncertainty a decentralised structure is required, and consequently a more sophisticated MAS (Abdel-Kader & Luther, 2008). More sophisticated reports from MAS can help to reduce uncertainty and improve managerial decision making (Chong & Chong, 1997). This finding leads to a conclusion that the design of MAS and the control process depend on (or are contingent upon) the context of the organizational setting in which these controls operate. However, very few accounting-control researchers have examined the direct effects of this organization structure on MAS design (Gerdin, 2005).

MAS innovation is influenced by the propensity of organizations to innovate and their capability to implement innovations. Organizational structure encourages or discourages the implementation of innovations (Gosselin, 1997). Gosselin (1997) also stated that organizational innovation theories have been developed and tested empirically in many organizations, mainly from the non-profit and public sectors. Very few of these theories were tested in manufacturing environments, and none of these innovation theories have been studied in an accounting setting. However, this study does not intend to test the organizational innovation theories, but to investigate the existence of any interrelationship between MAS and organizational structure, and whether the alignment between them can improve performance.

As much research focuses on the need for structural change to improve performance (Michael, Barsness, Lawson, & Balkundi, 2004; Miller & Friesen, 1982), very

limited research has focused on the what drives this change. Baines and Langfield-Smith (2003) have identified competitive environment, technology and strategy as drivers of structural change. But, the role of MAS in structural change has not been incorporated. Some of the previous research (Gosselin, 1997; Scott & Tiessen, 1999) studied the association between MAS and organizational structure. However, they do not explicitly consider the interrelationship between MAS and organizational structure and whether the alignment between these two variables can improve performance.

A study by Gosselin (1997) classified activity-based costing (ABC) as an administrative innovation, where its implementation may lead to new administrative procedures, policies and organizational structure. They show that more centralized and more formal organizations tend to adopt ABC. In recent years management accounting innovations such as total quality management (TQM), ABC and activity-based management (ABM) have developed as a response to the changing nature of operations and competition (Chenhall & Langfield-Smith, 1998a). These management accounting practices are not restricted to production processes, but also include innovative approaches to restructuring work practices and developing new planning and control systems. Many management accounting innovations associated with these change programs rely on promoting a high degree of employee involvement, often using work-based teams. The result is that much of the responsibility for delivering change lies with not only the shop-floor employees (Cohen & Bailey, 1997) but also senior management. Ma and Tayles (2009) found evidence that the new management accounting techniques would be adopted if it met the needs of senior management and it would not have taken place without their support.

Centralization (or vertical structure) has probably been the most prominent structural factor in the previous empirical research studying MAS design and changes (for example, Chenhall & Morris, 1986; Libby & Waterhouse, 1996). In a centralize structure, the decision making process is less effective and costly because knowledge has to be transferred to the person who has decision rights. Whereas, under decentralization the decision rights are transferred to the person who has the knowledge (Matejka & De Waegenaere, 2000). Matejka and De Waegenaere (2000)

found centralized organization will implement changes in their accounting systems less often than decentralized ones. This result is supported by Chenhall (2008, p. 525), where he noted that accounting systems are consistent with horizontal (or decentralized) organizations. He suggested that "strategic management accounting has characteristics related to aspects of horizontal organization as they aim to connect strategy to the value chain and link activities across the organization...". According to Chenhall (2008), a common approach in horizontal organization is identifying strategic priorities with a customer-oriented focus and then developing process efficiency and continuous improvements, flattened structures with a team-based focus and empowerment to help institutionalize change. On the other hand, Verbeeten (2010) found decentralization has negatively associated with major changes in the decision-influencing components of MACS.

A critical aspect of adopting team operations is the process of empowerment. Teams cannot simply be delegated responsibilities. Empowerment places both authority and responsibility at low levels in an organization. Changing the organization structure, including the use of teams and employee empowerment, will result in changed employer and employee expectations, including increased access to relevant information (Scott & Tiessen, 1999), particularly, management accounting information.

In an exploratory study of the relationship between an organization's environment, structure and MAS, Gordon and Narayanan (1984) concluded that structure was not significantly related to MAS. Instead they found that MAS and organization structures are both functions of environmental uncertainty. This is consistent with findings of Moores and Mula (1993). They found that organizational structure appears to be of major importance relative to environmental uncertainty and as a driving force behind the design of MAS. Haldma and Laats (2002) found organizational structure to be one of the organizational aspects influenced MAS to change. Whereas Ma and Tayles (2009) found a considerable evidence of how adoption of new strategic management accounting techniques and approaches support the new organizational structure. Thus, it would appear that MAS and structures are perhaps designed contemporaneously as internally consistent control packages.

The role of management accounting in this changed organization structure is not simply to deliver cost data, but to provide a service that empowers team members to make the best decision in the light of current changing conditions (Gordon & Miller, 1976). The management accounting of an organization is seen to be both one element of organizational structure and a consequence of the chosen structure (Luther & Longden, 2001). Gerdin (2005) also agreed that management control subsystems may not only complement each other but also substitute for each other. However this relationship is rarely, if ever, addressed in the previous research. By using a contingency framework this study aims to address this gap.

2.7.2 Management accounting and strategic change

Competitive advantage and superior performance can be gained through an adoption of MAS tailored to support business strategy (Simons, 1987). This includes the implementation of manufacturing processes and administrations functions that support their particular strategic priorities. It is argued that, the use of management accounting techniques, especially advanced techniques, can assist employees to more easily focus on achieving differentiation priorities, such as quality, delivery, customer service, as it highlights the need to satisfy customer requirements. For example target costing allows managers to focus on low cost while simultaneously maintaining customer expectations in areas of quality and functionality. According to Seal (2001), the MAS is presented as *system differentiation*. From the perspective of business policy, system differentiation may be the basis of a successful competitive strategy.

Strategy represents a very important contingency variable. MAS which is tailored to support strategy can lead to competitive advantage and superior performance (Langfield-Smith, 1997). Many scholars suggest that a congruent match between strategy and MAS is essential to performance (Govindarajan & Gupta, 1985; Simons, 1987). This argument is supported by Kaplan and Norton (1996). They suggest that the appropriate performance measurement system encourages actions that are congruent with organizational strategy. Chenhall and Langfield-Smith (1998b) found that high performing product differentiator strategy firms are associated with

management techniques of quality systems, integrated systems, team-based human research structure, and MAPs incorporating employee-based measures, benchmarking, strategic planning and activity-based techniques. On the other hand, high performing low-cost strategy firms are associated with management techniques of improving existing processes, integrating systems, innovating manufacturing systems and activity-based techniques. According to Verbeeten (2010) prospecter and analyzer strategies appear to be positively associated with major changes in MAS. Therefore, it can be concluded that strategy is an important factor in the design and use of MAS. This conclusion is congruent with the suggestion by Simons (1987) where MAS have to be modified in accordance with the strategy of a company.

Moreover, more contemporary viewpoints suggest that there may be a two-way relationship between these two variables, where "MAS shapes, and is shaped by, strategy" (Kober et al., 2007, p. 425). A study by Perera et al. (2003), on the diffusion of transfer pricing innovation suggests that, management accounting practices may both change as a result and instruments, and vary between the two in the same organization over time. This result made visible the reciprocal relationship between management accounting practices and strategy.

This view is confirmed by Kober et al. (2007), where they found that the interactive use of MAS mechanisms helps to facilitate a change in strategy, and that mechanisms change to match change in strategy. However, their study did not test the effect of this relationship on performance. Some other studies have also investigated the relationship between MAS and strategy. But these studies did not explicitly consider the interrelationship between MAS and strategy (Baines & Langfield-Smith, 2003; Hyvönen, 2007; Libby & Waterhouse, 1996). For example, Baines and Langfield-Smith (2003) found a significant relationship between changes in strategy and management accounting practices. This finding is supported by prior research that has found that practices such as quality improvement programs and benchmarking can support firms pursuing a differentiation strategy (see for example, Chenhall & Langfield-Smith, 1998b). Ma and Tayles (2009) in their case study also illustrated an eventual successful management accounting change with clear strategic focus as a result. They suggest that the adoption of the new practices should be fit with the organizations' strategic agenda and those practices that show high relevance

to organizations' strategic objectives are adopted.

The traditional views of the relationship between MAS and strategy suggest that MAS is an outcome of organizational strategy. Thus, it is not surprising that many contingency studies have been focusing on organizations' establishing strategies. However, with an increasing environmental uncertainty, MAS no longer acts as an outcome of strategy only, but must help facilitate strategic change in a proactive way (Kober et al., 2007). It is suggested that an accounting system could help shape the development of an organization through time (Hopwood, 1990). Kloot (1997) also suggests that MAS both impacts on, and is affected by, strategy. Thus this study could shed light on the observations of previous research on the relationship between MAS and strategy, and how the alignment between them can help in performance improvement of an organization.

2.8   Organizational Performance

As presented earlier, performance may be an antecedent or an outcome factor of management accounting and organizational change. Prior studies show that there may be a link between performance and change. Low financial performance is said to be one of the reasons for the firm to change its management accounting and internal organizational factors to improve performance (Granlund, 2001; Laitinen, 2006).

The contingency theory of management accounting suggests that if organizations implement MAS that suit their organizational and environmental factors, they are likely to perform better (Chenhall, 2003; Otley, 1980). This approach asserts that neither the MAS, nor the organizational configuration will effect performance; it is the fit between MAS and its contextual variables which is the most important determinant of performance (Jermias & Gani, 2002). Thus, this study investigates whether the changes in organizational and MAS actually helps firms to improve performance.

Much research on management accounting and organizational change focuses on performance in relation to its measurement (e.g., Andon, Baxter, & Chua, 2007;

Chenhall & Langfield-Smith, 1998a, 2003; Feurer & Chaharbaghi, 1995; Gomes et al., 2007; Hoque, 2005; Hoque et al., 2001). Even though some past research has examined the impact of management accounting and organizational change on organizational performance (see for example, Baines & Langfield-Smith, 2003; Choe, 2004; Hoque, 2004; Sisaye, 2003; Waclawski, 1996), these studies examine the impact of performance from one point of view only, either as a result of organizational change or management accounting change (e.g., Waclawski, 1996), and most of this research shows an indirect relationship between organizational change or management accounting change on performance (e.g., Baines & Langfield-Smith, 2003).

Hoque (2005) used non-financial performance measures in evaluating organizational performance operating in an uncertain environment. He argued that traditional performance measures are unable to satisfactorily reflect firm performance affected by today's changing business environment. Traditional measures which focus mainly on financial criteria such as return on investment or net earnings are narrow in focus, historical in nature and in many cases are incomplete (Hoque et al., 2001). It is argued that non-financial performance measures may enable a firm to address environmental change by clearly monitoring core competencies of the organizational process as well as creating greater efficiency throughout the organization and help managers to assess changes in their business environment, determine and evaluate progress towards the firm's goals, and affirm achievement of performance (Kaplan & Norton, 1996). This argument is supported by findings from Baines and Langfield-Smith (2003) which indicate that organizational performance is significantly associated with an increased reliance on non-financial management accounting information.

Hoque et al. (2001) suggest that in today's environment of computerized manufacturing and fierce competition, organizations need a multidimensional performance measurement system that should provide continuous signals as to what is most important in their day-to-day activities and where efforts must be directed. Thus, for this study, multiple performance measures are used to measure performance in manufacturing companies because the use of traditional performance measurement alone is not enough to measure performance for organizations

operating in highly competitive and advanced technology environments.

From the literature, it is suggested that organizational performance tends to be dependent upon the existence of fit between the use of organizational systems and the situational factors (Baines & Langfield-Smith, 2003; Chenhall & Morris, 1986; Haldma & Laats, 2002; Hoque, 2004; Hyvönen, 2007). Langfield-Smith (1997) provides evidence that a good match among organization's environment, strategy and internal structures, and MAS may result in high organizational performance.

As discussed previously, in contingency management accounting research, the fit of the relationship between the use of MAS and contextual variable is expected to have an influence on organizational performance. However, this has not been tested in previous management accounting change research (Baines & Langfield-Smith, 2003; Libby & Waterhouse, 1996). Therefore, this study explores whether an alignment between the change in MAS and the above factors might produce superior performance.

2.8.1   Management accounting practices and performance.

There is strong empirical support for the association between management accounting practice and performance, with an increased use of non-financial information. For example, Baines and Langfield-Smith (2003) show that a greater reliance on non-financial accounting information resulted in improved organizational performance. Chenhall and Langfield-Smith (1998b) found a greater use of advanced management accounting practices, such as quality improvement programs, benchmarking and activity-based management, in firms that placed a strong emphasis on product differentiation strategies, ultimately resulting in high performance.

Perera et al. (1997) found a positive association between the emphasis placed on various forms of management accounting practices in an environment of manufacturing flexibility, and the use of non-financial measures such as defect rates, on time delivery and machine utilization. Ittner and Larcker (1995), and Sim and Killaough (1998) both found a significant positive interaction between TQM

practices, management accounting information and performance, while Mia and Clarke (1999) found an indirect association between the intensity of market competition and business unit performance through the use of management accounting information.

While prior studies provide useful insight into management accounting change and innovations in organizations, so far little, if any, systematic empirical assessment on whether an alignment of MAS change with organizational factors in uncertain business environment may improve performance. Laitinen (2006) suggests that large changes in MAS may be associated with good financial performance. Those organizations which implement new MAS expect to improve their decision making or firm performance, thus, it is important to extend this matter to management accounting research.

2.8.2   Organizational structure and performance.

The contingency approach suggests that combinations of situational and structural variables may be more associated with organizational performance than either of these variables acting alone (Dalton, Todor, Spendolini, Fielding, & Porter, 1980). As cited in Dalton et al. (1980), Zwerman (1970) found no association between technology-structural fit performance, and Pennings (1976) reported that the fit between structural and environmental variables appeared to have little effect on performance. However, Baines and Langfield-Smith (2003) found that strategy is driving changes in organization design (with a greater use of team based structures) and resulted in improved organizational performance (with a greater reliance on non-financial management accounting information). None of these studies focus on the interrelationship between structure and MAS in performance improvement.

With the increasing use of team based structures, there is an increased need for easily accessible and relevant information at these levels, as well as relevant information for top management to evaluate the operations of the firm. Scott and Tiessen (1999) suggest that non-financial performance measures can form an integral part of the information base necessary for team success. There is evidence of the existence of a relationship between organizational design and performance: Pratt (2004) found that,

increasing employees' involvement in defining and creating their own work group goals as part of the mission and strategy will increase organizational performance; Moores and Yuen (2001) show an increasing need for formal reporting and objective performance evaluation as firms grow both in terms of activities and number of employees in order to achieve long term performance.

2.8.3   Organizational strategy and performance.

A clear strategic priority is a necessary but not sufficient condition to ensure high organizational performance. Some researchers found that strategic priorities should be supported by an appropriate control system, organizational structure, and management information system (Chenhall & Langfield-Smith, 1998b). Thus an appropriate link between them is important to performance improvement. Achieving an appropriate match between them is predicted to enhance performance (Jermias & Gani, 2002).

A key component in understanding how operations support strategic priorities and the interdependency of activities across the value chain is the formulation of performance measures designed to coordinate manufacturing decisions and activities to achieve a balanced set of strategic priorities (Chenhall & Langfield-Smith, 1998a). It has been argued that in order to support and evaluate the achievement of strategic advantages, reliance on financial performance measures alone will not necessarily improve financial results, as financial measures only indicate the outcome of past activities which may be no guide to improving future performance (Choe, 2004). Davila (2000), and Chong and Chong (1997) suggested that greater use of non-financial information for business units following a customer-focused or prospector-type strategy, had a positive impact on performance. On the other hand, Perera et al. (1997) found support for the hypothesized association between customer-focused strategy and the use of non-financial measures, but not for the link to organizational performance.

Thus, strategy, actions and measures have to work consistently. To achieve this, involvement of financial and non-financial performance measures is important. If quality and time become essential strategic criteria, financial performance measures

alone are less effective for the long run management of the company (Chenhall & Langfield-Smith, 2003). This does not mean that accounting data are not useful, but they have to be complemented by non-financial measures.

2.9 Summary

Globalization has changed the environment surrounding organizations operating in developing countries, with an increase in uncertainty, intensified industry competition and advanced technology. These have resulted in the need for the firm to reconsider its existing organizational design and strategies. As the firm strives to better fit with its environment, and be more successful, sustaining and/or improving current performance has become critical for organizations. However, very limited study has so far taken place on how competitive business environment and technological advancement has influenced management accounting and organizational change in the context of developing countries. Most empirical evidence in this area has been obtained from research in developed countries. This study intends to show how changes in the external environmental and technological factors in a developing country affect management accounting practices and the internal organization configuration, and whether these changes can contribute to performance improvement by the organization. By presenting evidence from Malaysia, a different perspective to findings is expected.

Prior research in management accounting has also examined the various relationships between the environment, organizational and management accounting system (see for example, Albright & Lee, 1995; Chenhall, 2003; Gurd & Thorne, 2003; Kloot, 1997; Lapsley & Pallot, 2000; Rowe, Birnberg, & Shields, 2008). Some types of information provided by management accounting systems can give rise to organizational learning (Chenhall, 1997) which in turn increase organizational performance (Choe, 2004). Although numerous studies have been undertaken into management accounting and organizational change (for example, Andon et al., 2007; Chenhall & Euske, 2007; Choe, 2004; Gomes et al., 2007; Jarvenpaa, 2007; Kaynak & Hartley, 2006; Laitinen, 2006; Lapsley & Pallot, 2000; Naranjo-Gil & Hartmann, 2007; J. A. Smith et al., 2005; Waweru et al., 2004) none of these has specifically

examined the interrelationship between management accounting and organizational change. There are few published studies that have incorporated the impact of these changes on organizational performance into a single research project. Moreover, most of these studies did not explain how changes in management accounting systems take place, with respect to the form of change (either as a replacement with new techniques or modification of existing techniques) and how such changes might contribute to the overall success of the organization. Thus, this study attempts to bridge this apparent gap in prior research by contributing to our understanding of management accounting and organizational change in Malaysia. In addition, the literature on the adaptation of management accounting to the environments of developing countries is limited, thus findings from this study may shed light on the role of management accounting in companies in other developing societies undergoing rapid change.

CHAPTER THREE
RESEARCH DESIGN

3.1   Introduction

The aspect of this empirical study is based on a review of management accounting and organizational change literature. A survey is used as the method for data collection in order to investigate the changes in external as well as internal organizational factors, and management accounting practices in Malaysia's manufacturing companies. A structured survey questionnaire was designed to cover six major areas within the conceptual model and developed hypotheses. This chapter is divided into various sections. The sections cover a discussion on the choice of survey as a data collection method, sampling and data collection procedures, questionnaire design, instrument development, as well as data analysis.

3.2   Background to the Survey

The review on management accounting and organizational change literature demonstrated that a case or field study was adopted as a common research method. As reported by Van der Stede, Young, and Chen (2007), only 30% of all published empirical management accounting research had used the mail survey method, over

the past 20 years[6]. Using contingency theory, this study aims to obtain a wider investigation of management accounting and organizational change. To achieve this, the survey method is seen as more appropriate relative to other methods, i.e., case and field study, which relies more on context and process. This choice is supported by Van der Stede et al. (2007), who pointed out that the survey is the common method used for theory testing in management accounting research.

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┌─────────────────────────────────────────────┐
│ 1: Survey Design                            │
│     -   Type of survey chosen                │
│     -   Target respondent                    │
│     -   Research questions/ hypotheses       │
│     -   Response categories                  │
│     -   Layout of the instrument             │
│     -   Sample selection                     │
└─────────────────────────────────────────────┘
                      │
                      ▼
┌─────────────────────────────────────────────┐
│ 2: Pilot Testing                            │
│     -   To improve the reliability and       │
│         validity of individual questions     │
└─────────────────────────────────────────────┘
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                      ▼
┌─────────────────────────────────────────────┐
│ 3: Data Collection                          │
│     -   Relevant and up-to-date mailing list │
│     -   Target specific respondents          │
│     -   Feedback to respondent (e.g.,        │
│         incentive, follow-ups)               │
└─────────────────────────────────────────────┘
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┌─────────────────────────────────────────────┐
│ 4: Measurement Error                        │
│     -   Measures of validity and reliability │
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Figure 3.1
Basic Survey Process

The current study uses a survey method and utilizes structural equation modelling to test a model of management accounting and organizational change and its causal association with changes in competitive environment and manufacturing technology, as well as performance. It is essentially a quantitative research framework. Thus, a well designed survey is critical in order to draw valid conclusions about the

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[6] This is based of their review on all empirical management accounting studies published in various journals from 1982-2001.

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relationships under investigation. Following M. Smith (2003), a basic survey process is outlined in Figure 3.1.

3.2.1   Concept of Survey

Many scholars provide s definition of surveys. However, these definitions are quite similar. For example, Bryman (2001, pp. 450-453) defined the survey as;

> *".... quantitative research which tends to bring out a static picture of social life... Survey was designed to provide information about the degree to which there was a consensus among members of the sample about certain circumstances".*

The central issue in the survey method is more on how it is deployed rather than with the method itself (Van der Stede et al., 2007). Survey research can be used for description and/or explanation. However, descriptive studies are designed to discover characteristics of a given population, not to test theory. In management accounting research, surveys are most commonly used for explanation, that is, to test theory that states the expected casual relationships among a set of variables. Surveys also provide a quick, inexpensive, efficient, and accurate means of assessing information about population (Zikmund, 2003). As for this study, a survey is designed based on the framework suggested by Van der Stede et al. (2007). They identified five key elements of a well-designed survey;

1. Purpose and design of the survey – A well designed survey should be conducted with a specific research objective in mind to avoid the inappropriate selection of samples of respondents and the use of misguided or irrelevant questions

2. Population definition and sampling – To determine whether valid inferences can be drawn from the characteristics of the sample and whom the inferences can be drawn about. This also depends on the sample size and response rate.

3. Survey questions and other research method issues – Focus on design validity, that is, the extent to which a survey study provides evidence

regarding the theories being tested (using pre-test procedures, follow-up procedures, non-response bias and types of independent measures).

4. Accuracy of data entry – Involves determining the procedures for data entry, checks for completeness, checks for reliability and accuracy, and rules for resolving inconsistencies.

5. Disclosure and reporting – Focuses on describing what research procedures were used and how data were collected and presented.

3.2.2   Types of Survey

This study adopted a longitudinal survey design to establish causal relationships. A longitudinal design is chosen as it provides greater confidence for causal inferences than does a cross-sectional design (Pinsonneault & Kraemer, 1993). Longitudinal design requires either repeated surveys over time or one-time surveys that ask respondents about measurements over time. Longitudinal study is defined by Zikmund (2003, p. 187), as;

> *"A survey of respondents at different points in time, thus allowing analysis of response continuity and changes over time"*

However, it is impossible for this study to conduct a repeated survey at different points in time as the aim of this study is to investigate the changes over the five year period from 2003 to 2007, though the study is initiated in early 2008. Therefore, to deal with this limitation, a one-time survey is used. Moreover, repeated surveys are also reported as subject to increasing non-response over time, and result in incomplete longitudinal data (Van der Stede et al., 2007).

Surveys can be conducted in any (or any combination) of these three types; personal or face-to-face interviews, telephone interviews; and mail (Cooper & Schindler, 2001; Zikmund, 2003). M. Smith (2003, p. 117) also includes email or internet-based research survey, these are not discussed here because there is still very little literature in the accounting domain with respect to this type of survey. The most common method of data collection in survey research is the structured questionnaire administered to a sample of respondents (Brownell, 1995). As noted above, the form

of administration can be either by mail, telephone or face-to-face interview. As the number of sample companies selected for this study is large (1,000 companies), the mail survey is adopted as it allows a large enough sample to reduce sampling error to acceptable levels, at considerably lower cost, and provides no opportunity for interviewer bias compared to face-to-face and telephone interviews (M. Smith, 2003). However, it is noted that there is no "best" method of survey (Zikmund, 2003). Each method has its own advantages and disadvantages. However, based on the above arguments, a mailed structured administered questionnaire is adopted in this study. Besides that, this method also allows respondents to answer questions when they are free, require short time periods for surveying large samples than personal or telephone interviews, and the anonymity of the questionnaires permits respondents to be more candid, so making the results potentially more valid and reliable (Cooper & Schindler, 2001).

The major weakness of the mail survey is non-response error. Non-response error is the statistical difference between a survey that includes only those who responded and a perfect survey that would also include those who failed to respond (Zikmund, 2003, p. 178). However, many studies have shown that better-educated respondents and those who are more interested in the topic, answer mail surveys (Cooper & Schindler, 2001). According to Cooper and Schindler (2001), mail surveys with a return of about 30 percent are often considered satisfactory. However, M. Smith (2003, p. 125) suggests that response rates of less than 25 percent are common in accounting research.

This study adopted a research design suggested by Baines and Langfield-Smith (2003). Several limitations of the Baines and Langfield-Smith (2003) study are addressed in this research. Firstly, they do not test the interrelationship between the contextual variables, even though the literature suggests that a reciprocal relationship between the variables is possible. Secondly, they only used advanced management accounting techniques to measure management accounting practices in an organization. It is, however suggested in the literature that companies tend to combine both advanced and traditional techniques in order to improve performance. Thirdly, this research provides a more detailed study to capture the time lag between various organizational changes over five years, compared to the three years

considered by Baines and Langfield-Smith (2003). Finally, Baines and Langfield-Smith (2003) measure changes in manufacturing technology as a consequence of changes in organizational factors. However, based on a literature review, manufacturing technology is but one of the environmental factors which can cause changes in organizational factors. By testing these causal relationships in a developing economy setting, i.e. Malaysia, different findings might be anticipated.

3.3   Questionnaire Design

A structured questionnaire was developed from existing instruments to enhance the validity and reliability of the measures (i.e., Askarany & Smith, 2008; Baines & Langfield-Smith, 2003; Hoque et al., 2001; Hyvönen, 2007; Sulaiman & Mitchell, 2005). Besides the demographic information, sections in the questionnaire covered all the six areas within conceptual model. They are:

1. Competitive environment.
2. Advanced manufacturing technology.
3. Organizational design
4. Organizational strategy
5. Management accounting practices
6. Organizational performance.

The variables were adopted from previous research in developed countries. Since manufacturing industry in Malaysia is more concentrated than those of most developed countries (Bhattacharya, 2002), it is believed that, these variables could be used in manufacturing firms in Malaysia. However, because there are certain differences in business environment in Malaysia as compared to developed countries and most other developing countries (as discussed earlier), the applicability of these variables in a Malaysian environment was first confirmed through a pilot study of 41 manufacturing companies in Malaysia (see Chapter 5).

In designing the questionnaire, several factors are taken into consideration, notably, time taken to complete the questionnaire, appropriate person to answer the questionnaire and the wording used in the questionnaire. The pilot test is required to

address these issues. As suggested by M. Smith (2003), time taken to complete the questionnaire should be less than 20 minutes in order to maintain interest and motivation of the respondent. A five-year period (2003-2007) has been adopted in this study as it was conceived in early 2008.

3.3.1 Response Format and Scaling

It is important to take into high consideration on questions format and scaling in order to produce accurate and meaningful data. There are two types of commonly used question formats: open-ended and closed questions. Open-ended questions allow respondents to answer them in any way they choose, while closed questions require respondents to make choices among a set of alternatives given, thus helping the respondents to make quick decisions (Sekaran, 2003). As for this study, the main scaling format used was closed questions, mainly using Likert-scales. However, the open-ended format was also utilised for the purpose of collecting the respondents' opinion on the items that were included and/or not included in the questionnaire.

Another important issue in designing a questionnaire is measurement scales to be used. This is essential in order to ensure that the collected data are appropriate for the hypotheses testing. The four types of scales are nominal, ordinal, interval, and ratio. A nominal scale is the simplest type of scale, where the numbers or letters assigned to objects serve as labels for identification or classification ("in name only"). An ordinal scale arranges objects or alternatives according to their magnitude in an ordered relationship. For the interval scale, it not only indicates order, but also measures order (or distance) in units of equal intervals. The ratio scale has absolute rather than relatives quantities (Zikmund, 2003, pp. 296-298).

The selection of scales was based on information requirements, the goal of survey, ease of development and administration, and the data analysis procedures. In this study the nominal, ordinal and interval scales were used, since respondents are normally more comfortable with these types of scaling rather than a specific absolute numbers (Nardi, 2006). A category scale was used for measuring type of industry, type of product, number of employees and annual sales. Likert-scales were used to measure changes in competitive environment, manufacturing technology,

management accounting practices, organizational structure, strategy and performance.

3.3.2   Ethical Issues

Ethics are norms or standards of behaviour that guide moral choices about behaviour and relationship with others (Cooper & Schindler, 2001, p. 112). The goal of ethics in research is to ensure that no one is harmed or suffers adverse consequences from research activities. In survey research, a major ethical issue is the invasion of privacy (Nardi, 2006). In this study, the purpose of the research and the instructions of how to respond were included in the cover letter. In this letter, respondents were also informed that any information provided would be treated in the strictest confidence. As this study used a mail survey, return of the questionnaire was taken to imply permission (M. Smith, 2003, p. 97). The questionnaire and cover letter used in this study were approved by the University's Research Ethics Committee.

3.3.3   Pre-Test

According to Van der Stede et al. (2007), survey questions should always be pre-tested to assess whether they can be correctly understood and easily answered by respondents. Thus, the questionnaire was first pre-tested through peer evaluation (colleagues) at Edith Cowan University (ECU) to test whether respondents can understand the wording of the questions, the time taken to complete the questionnaire and if they had difficulties in completing the questionnaire. Besides peer-evaluation, the questionnaire was also pre-tested in a pilot study on prospective respondents which included potential users of the data (i.e., accounts/ finance managers in manufacturing firms in Malaysia). This is consistent with the recommendation by Dillman (1978), to submit the questionnaires to colleagues, prospective respondents, and the users of the data for pre-testing.

Pre-testing was undertaken in order to improve the quality of the instruments, to increase respondent understanding of all questions, and to detect any weaknesses in the questionnaire. Pre-testing with the prospective respondents is important as it

increases the likelihood that the survey uses terminology that reflects the respondents frame of reference (Van der Stede et al., 2007). Among the suggestions received during pre-testing among colleagues were concerns that the wording used in the questionnaire which might cause bias. The questionnaire was revised in response to these concerns. The updated version of the questionnaires was mailed to 200 sample companies for the pilot study.

The objectives of the pilot study are to confirm the applicability of the variables in the Malaysian environment and also to explore the potential association among changes in a manufacturing business environment with management accounting practices and organizational factors. Results from the pilot study were used as a guideline in hypotheses development. Pilot testing is especially important in mail surveys because there are no interviewers to report problems in the questions and the survey instrument to the researcher (Van der Stede et al., 2007). Thus, the pilot test can test both the questions and the questionnaires.

3.4   Instrument Development

The instruments in this study were designed to capture information on the competitive environment, technologies, management accounting, organizational structures, strategies and performance. The investigation seeks to find out whether changes in technology and the competitive business environment cause changes in management accounting practices, organization's structure and strategy during a five year period from 2003 to 2007 inclusively. It is also to find out how the alignment of the management accounting system, structure and strategy would impact the performance. The measures used were generated from previous research and had been modified to suit this study.

The instruments were used in two stages: pilot study and the actual survey. Together with the findings from the literature search, the results from the pilot study (exploratory stage) have added to the knowledge on the existing level of competition, technologies development, organizational and management accounting practices in Malaysian manufacturing firms. It also facilitates the development of hypotheses for this study. The instrument development covered the following topics:

1. Section A: General demographic information about organization.
2. Section B: Information on environmental and technological change.
3. Section C: Information on organizational change.
4. Section D: Information on changes in management accounting practices
5. Section E: Information on changes in organizational performance.

The variables measured in this study covered all the six areas of the conceptual framework. An 11-point Likert scale was adopted from the study by Baines and Langfield-Smith (2003), to capture decrease change (-5 to -1), no change (0) and increase change (+1 to +5). Where relevant, respondents have the opportunity to indicate if the various practices or items had never been used or adopted (indicated as N/A). At the end of the questionnaire, respondents were given a space to give any comments or suggestions on the questionnaire.

The most important consideration in the Likert scale is the inclusion of at least 5 response categories (Allen & Seaman, 2007). As a general rule, Likert recommend that it is best to use as wide a scale as possible (Gibbons, 1993). Then, later on, the responses can be collapsed into condensed categories, if appropriate, for analysis, especially when the issue of normality arises.

3.4.1   Section A

Section A was designed to seek general information about organizations. The information covered by questions 1 to 4 included: industry classification, type of company, type of product, the range of number of employees and the range of total annual sales.

The question on industry classification was designed to filter out companies according to their industry group. Generally there are two types of manufacturing companies classified in Malaysia, i.e., based on consumer product and industrial product. Federation of Malaysian Manufacturer (FMM) has specifically grouped these companies in Malaysia into 24 groups based on the product manufactured. However, these groups can be re-categorized into 11 classifications, for use with this instrument:

1. Electrical and electronics
2. Engineering supporting
3. Food processing
4. Life sciences
5. Machinery equipment
6. Petrochemical and polymer
7. Rubber products
8. Textiles and apparel
9. Transport equipment
10. Basic metal products
11. Wood-based
12. Others

The question on type of company, to determine whether they are local or foreign-based companies operating in Malaysia, was designed in order to identify if such companies have responded to the changes in environment in a different way. The respondents were also asked to identify their product either as a consumer or industrial product or both.

The question on number of employees of an organization was used to identify the company size. In identifying the number of employees in the organizations, the respondents were asked to categorise their organization based on the following scales:

- Less than 50
- 50-150
- 151-500
- 501-1000
- Over 1000

3.4.2   Section B

Over the last decade or so, competitive environment and manufacturing technology have changed significantly, and continue to change. Manufacturing firms have

experienced significant changes in their business environment with advances in information technology and highly competitive environments. Many relevant management accounting studies have highlighted these changes (e.g., Burns & Vaivio, 2001; Choe, 2004; Gomes et al., 2007; Haldma & Laats, 2002; Hopwood, 1990; Hussain & Hoque, 2002; Innes & Mitchell, 1995; Kaplan & Norton, 1996; Libby & Waterhouse, 1996; Scapens, 1999; Vamosi, 2003).

This section seeks information on competitive environment and technological changes in an organization over the past five years from 2003 to 2007. The purpose of section B is to identify to what extent competitive environment and advanced manufacturing technology has changed in the organization.

To measure competitive environment respondents were asked to indicate the extent to which they believe the competitive environment of their business unit had changed over the past five years using an 11-point Likert scale. The anchors are ranging from "significantly less competitive" (-5) to "significantly more competitive" (+5). The items for competitive environment were derived from instruments used by Hoque et al. (2001). The items are:

- Price competition
- Competition for new product development,
- Marketing (or distribution channels) competition
- Competition for markets (or revenue) share
- Competitor's actions
- Number of competitors in your market segments.

As for the advanced manufacturing technology, respondents were asked to indicate the extent to which they believe the advanced manufacturing technology of their business unit had changed over the past five years. The anchors of the 11-point scale are "used significantly less" to "used significantly more". The items for advanced manufacturing technology were derived from instruments used by Askarany and Smith (2008), as follows:

- Robotics
- Flexible manufacturing systems

- Computer-aided design
- Computer-aided engineering
- Computer-aided manufacturing
- Computer-aided process planning
- Testing machines
- Just-in-time
- Direct numerical control
- Computer integrated manufacturing
- Numerical control.

3.4.3 Section C

This section seeks information on changes in the internal organizational factors over the past five years. This section is aimed to cover the extent to which the use of a range of organizational design practices and strategic emphasis in the organizations has changed over the past five years.

The items for organization structure were adapted from instrument employed by Baines and Langfield-Smith (2003). The 11-point Likert scale ranged from "used significantly less" to "used significantly more". They are:

- Multi-skilling of workforce
- Worker training
- Cross-functional teams
- Establishing participative culture
- Management training
- Flattening of formal organizational structures
- Work-based teams
- Employee empowerment
- Manufacturing cells

As for the organization strategy, the measures were also adapted from the instrument used by Baines and Langfield-Smith (2003), which focused on the differentiation

strategy. The 11-point Likert scale ranges from "emphasized significantly less" to "emphasized significantly more". The items include:

- Provide on time delivery
- Make dependable delivery promises
- Provide high quality products
- Provide effective after sales service and support
- Make changes in design and introduce new product quickly
- Customize products and services to customer needs
- Product availability (broad distribution)
- Make rapid volume/product mix changes.

3.4.4 Section D

This section seeks information on changes in management accounting practices in an organization. This section aimed to identify the extent of the range of use of management accounting practices in the organization over the past 5 years and also how these changes took place. The items embrace both traditional and advanced management accounting techniques using an instrument developed by Baines and Langfield Smith (2003). However, the instruments used by Baines and Langfield Smith (2003) only covered advanced management accounting techniques; thus, the consideration of traditional management accounting techniques is added to the instruments. To identify the extent of changes in management accounting practices, an 11-point Likert scale is used, ranging from "used significantly less" to "used significantly more".

The same items were used in measuring the form of changes in management accounting systems, the respondents were asked to indicate the technical level changes occurring in their organization from the past 5 years, using the instrument developed by Sulaiman and Mitchell (2005). Five different categories were used to measure the changes which include addition of new components, replacement of components, modification of information outputs, modification of the operation of the system, and reduction of the system, ranging from scale 1 to 5. Scale 0 is used if

no changes occurred and "not applicable" if the items were not practiced (indicated as N/A).

The items include:

- Budgetary control
- Absorption costing
- CVP analysis
- Variable costing
- Standard costing
- Total quality management (TQM)
- Target costing
- Activity based costing (ABC)
- Activity based management (ABM)
- Value chain analysis
- Product life cycle analysis
- Benchmarking
- Product profitability analysis
- Customer profitability analysis
- Shareholder value analysis / EVA

3.4.5   Section E

This section seeks information on changes in organizational performance over the past five years. Items are measured using a two-part measurement instrument adopted from Baines and Langfield-Smith (2003). Items include both financial and non-financial measures (Hoque et al., 2001). The first part of the measure asks respondents to compare the change in their business unit's performance relative to their competitors, over the past five years. An 11—point Likert scale is used, ranging from "significantly lower performance than competitors" (score -5) to "significantly higher performance than competitors (scored +5). The second part of the measure requires respondents to assess the same items in terms of their importance to the business unit, on a 5-point Likert scale ranging from "no importance" (score 1) to

"extremely important" (score 5). The final score is determined by multiplying the respective "performance" and "importance" scores following (Baines & Langfield-Smith (2003).

Items include:

- Operating income
- Sales growth
- Return on investment
- Cash flow from operations
- Market share
- Market development,
- New product development
- Research and development (R&D)
- Cost reduction programs/ cost control
- Personnel development
- Workplace relations
- Employee health and safety

3.5 Sampling Procedures

The sample was drawn from manufacturing industry in Malaysia. For several reasons management accounting change is likely to occur in this type of company (Sulaiman & Mitchell, 2005). Manufacturing companies are exposed to changes in the manufacturing environment such as changes in production cost structure (Innes & Mitchell, 1990) and new high technological manufacturing techniques (Kaplan, 1989). Due to the changes in the manufacturing environment, these companies are also commonly associated with innovation in management accounting techniques, such as ABC, JIT and TQM (M. Smith, Abdullah, & Abdul-Razak, 2008). Furthermore, most prior studies on management accounting change had also selected manufacturing companies in their survey (for example, Abdel-Kader & Luther, 2008; Baines & Langfield-Smith, 2003; Cadez & Guilding, 2008a; Gerdin, 2005; Laitinen,

2006; Moores & Mula, 1993). This industry is also selected as it is the most active and important contributor to the Malaysian economy[7].

The focus for this study is the manager of the accounts/finance department from manufacturing companies in Malaysia. The head of the accounting/ finance department was chosen because most of the manufacturing companies in Malaysia did not have a separate management accounting unit (M. Smith et al., 2008). As highlighted by Baines and Langfield-Smith (2003, p. 684), managers' perceptions are considered appropriate in this situation, compared to the use of more objective measures because:

1. It is managers' perception of the environment which are of interest, as it is these perceptions that will influence decisions with respect to the choice of strategy and changes in other organizational and management accounting variables.
2. It is difficult to measure objectively variables such as the extent of change in the environment, or change in strategic emphasis.
3. It has been argued that individuals have sufficient understanding of their decision process to be able to give relatively reliable information.

The list of manufacturing companies in Malaysia was taken from the Federation of Malaysian Manufacturers (FMM) Directory of Malaysian Industries 2008[8]. There are more than 2,000 companies registered with FMM. This directory was used as the sampling frame for this research. A sampling frame is important to make sure samples adequately represent the intended target population to which the hypotheses-testing results are generalised (Van der Stede et al., 2007). For example Perera et al. (1997) used *Riddell's Business Who's Who Australia 1994* to randomly select 200 managers of manufacturing firms or divisions.

The target population for this study are the manufacturing firms which were incorporated before 2003. This is congruent with the objective of the survey to analyse the changes in manufacturing firms over the five years period from 2003 to 2007 inclusively. The survey population of 1,000 manufacturing firms in this study

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[7] Source: http://www.fmm.com.my
[8] This was the latest edition at the time of study.

were selected using probability sampling (simple random method). Under probability sampling, samples are selected such that every element of the survey population in sampling frame has a known non-zero chance of being selected. Therefore, it increases the representativeness of survey results (especially with a high response rate), thus allowing inferences to be made from the sample to the survey population within a calculable margin of error (Van der Stede et al., 2007). Whereas, in non-probability sampling, some survey population members are more likely to be selected in the sample than others. Thus, there is a likelihood of biased samples and quantitative inferences from such samples, so that they can only be viewed only as indicative (Van der Stede et al., 2007). Population definition and sample selection are important because they determine whether valid inferences can be drawn from the characteristics of the sample.

Out of 1,000 companies, 200 were chosen for pilot study. These companies were randomly selected from two regions, i.e. Klang Valley and northern region (Penang). These two regions were selected due to the fact that these are the two most industrialised areas in Malaysia (FMM, 2008; M. Smith et al., 2008). Response rates for pilot study also gave a guideline in determining the sample population likely to be required for the actual survey. From the pilot test, it was anticipated that a response rate of 20 per cent could be achieved. This study used Structural Equation Modelling (SEM) as a main data analysis technique, which requires a minimum sample size of 100 as a suggested rule of thumb. However, it has also been suggested that a sample size of 200 may be required to generate valid fit measures and to avoid drawing inaccurate inferences (D. Smith & Langfield-Smith, 2004). Thus, in order to obtain a target sample of at least 200, 1,000 companies were randomly selected as a survey population. Such a sample is considered sufficient for statistical analysis and ultimately for accomplishing the objectives of this research.

Most textbooks recommend a standard treatment in determining sample size, by deciding how much precision is required (the confidence of interval), which requires an estimate of both the sample variances and an estimate of the expected response rate. However, this approach is often not pragmatic when designing studies in management accounting (Fowler, 1984, cited in Van der Stede et al., 2007, p. 463). This argument is supported with the following arguments:

1. The vast majority of survey studies in management accounting are theory-testing studies (89%)[9], not studies concerned with measuring the "mean" of a variable within a sample and generalizing it to a population.

2. Surveys in management accounting invariably try to obtain from respondents as much information as possible related to the multiple variables of interest to the theory (relationships) being tested (within the confines of acceptable survey length).

According to Van der Stede et al. (2007), management accounting surveys are usually designed to make estimates about relationships among multiple variables, thus, making it unlikely to be able to specify a desired level of precision in more than just the most general of ways.

3.6   Data Collection Procedures

Data were collected using a mail survey. To enhance the response rate, a reminder letter was sent out to the whole sample (even if they had already replied) as a follow-up procedure. According to Dillman (1978), follow-up procedures effectively improve response rates and help bring the more resistant respondents into the study, sooner. Another way to increase response rates is to seek cooperation from a corporate officer, industry association, or some other authority. In this case a letter to seek the co-operation from FMM in data collection was sent to its Chief Executive Officer. Phone calls and emails to the respective officer had also been made, but the response had been negative. Therefore, the data are collected using a self-administered questionnaire. Another possibility to increase the response rate is through providing compensation to respondents (monetary and non-monetary). In this study, compensation is not offered to the respondents as it is costly and might cause bias. It would also create a further and unnecessary variable for the study.

Following the preparation of the instruments, 200 questionnaires were mailed on 20th November 2008 for the pilot test. The contact information of the firms was obtained

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[9] This figure was determined by Van der Stede et al.(2007) by counting all empirical management accounting studies that employ mail survey method published in various accounting journals from 1982-2001.

from FMM Directory 2008. Within a month, 41 questionnaires were returned, which give a response rate of 20.5 percent. Review of the pilot test revealed that the instruments were applicable to Malaysian manufacturing companies (details of the pilot study result are discussed in Chapter 4). Therefore, another 800 questionnaires were sent out on 15th January 2009 to constitute the actual survey. The responses for the pilot study are added to those from the actual survey to get the total responses for data analysis.

The questionnaire consists of 8 pages (four double sided pages) plus a cover letter explaining the purpose of the study and how to respond. Two pre-paid self-addressed envelopes were attached with the questionnaire. One for returning the questionnaire and the other one for the respondent to send contact information form. A contact information form is used for the respondents who wish to have a copy of the survey result, as had been explained in the covering letter. Different envelopes were used in order to maintain anonymity of the survey. The covering letter also emphasized that the information would be treated in the strictest confidence and that only aggregated findings would be reported in this study. Covering letters were printed on the University's letter head; contact information of the researcher and supervisor are also included in covering letter. Contact information of the University's Research Ethics Officers was also provided in the covering letter in case respondents had any concerns and wanted to speak to an independent person regarding the research project.

Within three weeks of the mailing of the initial questionnaire, 62 companies had replied, which give a 7.8 percent response rate (out of 800). A follow-up letter was sent to all respondents three weeks after the initial questionnaire reminding them about the questionnaire and seeking their co-operation in completing the survey and forwarding it using the pre-paid envelope provided. All respondents that had already responded to the questionnaire were issued with an apology and thanked for their co-operation in completing the survey.

Within three weeks after sending the first follow-up letter, another 64 companies had responded, which give a total response rate to date of 8 percent out of the 800. Then, a second reminder letter was mailed to all respondents three weeks after the first reminder. This time, a further copy of the questionnaire was attached, just in case

they had misplaced the first one, and again all respondents that had responded to the questionnaire were issued with an apology and thanked for their co-operation in completing the survey.

The final wave gave another 48 responses. Thus, the total responses to the questionnaires were 215, which give a response rate of 21.5 percent. However, out of 215 questionnaires returned, three were incomplete, leaving 212 questionnaires useable for analysis. According to M. Smith (2003, p. 125), such a response rate (i.e., less than 25 percent) is now common in accounting research, but, this rate is considered sufficient for statistical analysis and inferences. The summary of the data collection process is presented in Table 3.1.

Table 3.1
Summary of Data Collection Procedure

Posted Date	No. Of Questionnaires	Replied	Response Rate (%)
Pilot study (20th Nov 2008)	200	41	4.1
Actual Survey (15th Jan 2009)	800	62	6.2
First follow-ups (5th Feb 2009)		64	6.4
Second follow-ups (26th Feb 2009)		48	4.8
Total	**1,000**	**215**	**21.5**
Incomplete questionnaires		3	0.3
Useable Questionnaires		**212**	**21.2%**

3.7   Data Analysis

The Structural Equation Modelling (SEM) is used as the main statistical technique to test the hypothesized model developed in this study. Besides SEM, a non-parametric technique (Spearman's rank order correlation) was used to test the subsidiary hypotheses. SEM is a comprehensive tool for testing hypotheses about relationships

between variables. The SEM procedure and its use in this study is explained and justified below.

3.7.1 Validity and Reliability of Measures

Major criteria for evaluating measurements are validity and reliability. Reliability and validity are two different but closely related conditions. Reliability refers to the consistency of measurement, whereas validity is the accuracy of the measures (Holmes-Smith, 2005). Zikmund (2003, p. 300) defined validity as "the ability of a scale or measuring instrument to measure what it is intended to measure". There are three ways to evaluate validity:

1. Face validity – subjective agreements among professionals that a scale logically appears to reflect accurately what it purports to measure.
2. Criterion validity – the ability of some measure to correlate with other measures of the same construct.
3. Construct validity – the ability of a measure to confirm a network of related hypotheses generated from a theory based on the concepts.

Face validity is achieved by using measures established from previous research (i.e., Askarany & Smith, 2008; Baines & Langfield-Smith, 2003; Hoque et al., 2001; Hyvönen, 2007; Sulaiman & Mitchell, 2005). There are two elements of construct validity: convergent validity and discriminant validity. Convergent validity occurs when indicators correlate strongly with their assumed theoretical constructs, whereas dicriminant validity reflects the extent to which the constructs in a model are different (Holmes-Smith, 2005). Details of these validity measures are explained as part of the discussion of statistical analysis in Chapter 6.

Reliability is the degree to which measures are free from error and therefore yield consistent results (Zikmund, 2003). According to Zikmund (2003), two dimensions which underlie the concept of reliability are repeatability and internal consistency. Repeatability can be assessed using a test-retest method which involves administering the same scale or measures to the same respondents at two separate times to test for stability. If the measure is stable over time, the result of the test

should be similar. Internal consistency concerns the homogeneity of the measure. The split-half method is the most basic technique for checking internal consistency when a measure contains a large number of items. The other method available is the equivalent-form method, where two alternative instruments are designed to be as equivalent as possible.

The reliability of the indicators of construct in the model is assessed by examining factor loadings of the indicators. Items with loadings of 0.5 or above are retained since they add adequate explanatory power to the model. Other than that, Cronbach's coefficient alpha is used to assess the internal consistency of the measures for each construct. Cronbach's alpha has the most utility for multi-item scales at the interval level of measurement (Cooper & Schindler, 2001).

3.7.2   Structural Equation Modelling (SEM)

SEM is a statistical technique that allows the simultaneous analysis of a series of structural equations and is particularly useful when a dependent variable in one equation becomes an independent variable in another equation (D. Smith & Langfield-Smith, 2004). There are two-stages in SEM process, i.e., the analysis of the measurement models and analysis of the structural model (Schumacker & Lomax, 1996; D. Smith & Langfield-Smith, 2004). The measurement model specifies relations between manifest (observed) variables and latent variables. The structural model is a model of relations between latent variables, incorporating specified measurement error. According to Hair, Black, Babin, Anderson and Tatham (2006) SEM involves a six-stage decision process as outlined in Figure 3.2. Stages one to three of the process are discussed throughout this chapter, while stages four to six are discussed with the data analysis in Chapter Six.

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┌─────────────────────────────────────────────┐
│                   Stage 1                    │
│        Defining the Individual Constructs    │
│  -   What items are to be used as measured variables │
└─────────────────────────────────────────────┘
                        │
                        ▼
┌─────────────────────────────────────────────┐
│                   Stage 2                    │
│      Develop and Specify the Measurement Model │
│   -    Make measured variables with constructs │
│   -    Draw a path diagram for the measurement model │
└─────────────────────────────────────────────┘
                        │
                        ▼
┌─────────────────────────────────────────────┐
│                   Stage 3                    │
│   Designing a Study to Produce Empirical Results │
│      -     Assess the adequacy of sample size │
│  -    Select the estimation method and missing data approach │
└─────────────────────────────────────────────┘
                        │
                        ▼
┌─────────────────────────────────────────────┐
│                   Stage 4                    │
│       Assessing the Measurement Model Validity │
│  -   Assess line GOF and construct validity of measurement │
│                     model                    │
└─────────────────────────────────────────────┘
                        │
                        ▼
┌─────────────────────────────────────────────┐
│                   Stage 5                    │
│            Specify Structural Model          │
│   -   Convert measurement model to structural model │
└─────────────────────────────────────────────┘
                        │
                        ▼
┌─────────────────────────────────────────────┐
│                   Stage 6                    │
│         Assess Structural Model Validity     │
│  -   Assess the GOF and significance, direction, and size of │
│            structural parameter estimates    │
└─────────────────────────────────────────────┘
                        │
                        ▼
                 Structural Model Valid?
        No                              Yes
┌──────────────────────────┐   ┌──────────────────────────┐
│ Refine model and test with │ │ Draw substantive conclusions │
│ new data                   │ │ and recommendations          │
└──────────────────────────┘   └──────────────────────────┘
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Figure 3.2
Six-Stages Decision Process in SEM
(Source: Hair et al., 2006)

SEM is considered the most appropriate method when the research stream has a relatively sound theory. There is a reasonable strong body of knowledge in modelling relations between environment, strategy and organizational structure, and a considerable body of accounting literature that has explored relations between strategy and non-financial measures (D. Smith & Langfield-Smith, 2004). Moreover, SEM can be used to specify causal direction in specific situations. However, it should be noted that although SEM is often referred to as "causal modelling", it can only provide evidence of causality, not establish causality (Hult et al., 2006).

SEM emphasizes the analysis of sample variances and covariances rather than individual cases. Instead of minimizing the sum of squared differences between the predicted and observed scores for each case, the SEM technique involves minimizing the difference between the matrix of sample variances and covariances and the matrix of predicted variances and covariances generated from using a set of parameters that describe the causal model underlying the relationship amongst the variables. Thus, SEM develops a comprehensive model to test hypotheses in this study.

Compared to other traditional analyses, for example multiple regressions, results of SEM are more informative for management accounting theoreticians. SEM allows a range of relations between variables to be recognized in the analysis. Thus, SEM provides the researcher with an opportunity to adopt a more holistic approach to model building. Other than that, a major difference between SEM and other traditional analyses is the ability to account for the effects of estimated measurement error of latent variables. This is particularly relevant to management accounting research when composite measures are often used to measure the construct. The use of interaction terms in multiple regressions may encompass significant measurement error, particularly when used with composite variables. These problems have led prominent management accounting researchers to suggest that multiple regression techniques are inappropriate in many situations (D. Smith & Langfield-Smith, 2004).

There are two main types of SEM:

1. Covariance-based structural equation modelling (CBSEM), such as Linear Structural Relations (LISREL).
2. Variance-based (or component-based) approach, for instance Partial Least Square (PLS).

This study uses a CBSEM approach and employs LISREL for Windows version 8.80 to analyse the data. The CBSEM approach enables researchers to construct unobservable latent variables, model errors in measurement, and statistically test a priori theoretical and measurement assumptions against empirical data. As compared to PLS which is a softer modelling approach used to determine values of the latent variables for predictive purposes (Chin, 1998), CBSEM involves analysis using a set of parameters that describe the causal model underlying the relationship amongst the variables. Under this condition, indicators are viewed as being influenced by the underlying latent construct (reflective mode).

This study aims to examine the effect of changes in MAP as well as organizational structure and strategy on performance, which caused by the changes in competitive environment and AMT. Hence, CBSEM is the best method for analysing the hypotheses developed from the conceptual framework in this study.

3.7.3   Data Distribution and Estimation Techniques

Multivariate Distribution. Most of the estimation techniques in SEM assume multivariate normality. In the case of a non-normal distribution, the researcher can take corrective action to rectify the violation of the normality assumption using data transformation such as square root, logarithm or inverse (Zikmund, 2003). However, a new research stream does not encourage data transformation. According to Shook, Ketchen Jr., Hult, and Kacmar (2004) data transformation is not without problems. They argued that if the researcher has developed a strong theoretical foundation and belief in the original specification, data transformation can provide an incorrect specification. This argument is supported by Hult et al. (2006). They argue against data transformation as it often violates the theoretical logic underpinning the original

dataset. Therefore, another alternative approach is to use an estimation method that does not assume multivariate normality or that adjusts the model fit statistics and standard errors of individual parameters estimates, as for example using weighted least squares (WLS) or an asymptotically distribution free (ADF) estimation technique (Henri, 2007; Hult et al., 2006; D. Smith & Langfield-Smith, 2004).

According to Henri (2007), out of 41 studies in the management accounting field using SEM, 25 (61%) did not discuss the distribution characteristics of the data. Among the 16 studies (39%) that did address the normality issue, three noted the normality of their data, while 13 observed that their data were non-normal. Of the 13 studies reporting a non-normal distribution, only one did not address the issue of corrective action. The other 12 studies have either undertaken corrective action or explicitly recognized and justified that no such action has been attempted. Of the eight studies reporting corrective action, two have transformed data while the remaining six have used a specific estimation approach (e.g., generalized least squares). Similar findings were obtained by Hult et al. (2006) and Shook et al. (2004). A summary of their findings is presented in Table 3.2 below.

Table 3.2
Summary of the Findings of Normality Issue

Normality Issues	Henri (2007) (N=41)	Hult et al. (2006) (N=148)	Shook et al. (2004) (N=92)
Did not discuss	25 (61%)	134 (91%)	75 (81%)
Discussed:	16 (39%)	14 (9%)	17 (19%)
- Data normally distributed	3	9	8
- Not normally distributed	13	5	9
- No corrective action	1	1	-
- Take corrective action	12	4	9
o Transform	8	-	9
o Use specific estimation technique (e.g. GLS, WLS)	6	4	-

Another alternative suggested by Hair et al. (2006) is to ensure that the ratio of respondents to parameters is higher. A generally accepted ratio to minimize problems with deviations from normality is 15 respondents for each parameter estimated in the model. Although some estimation procedures are specifically designed to deal with

non-normal data, the researcher is always encouraged to provide sufficient sample size to allow for the sampling error's impact to be minimized (Hair et al., 2006). This study has 13 parameters to be estimated in the model, thus a sample size of 212 is considered sufficient to minimize the problem (i.e., 13 parameters x 15 respondents = 195 sample size).

Estimation Techniques. The most common SEM estimation procedure are generalised least squares (GLS) and maximum likelihood estimation (MLE) (which is the default in most SEM programs such as LISREL). The potential sensitivity of MLE techniques to non-normality, however, created a need for alternative estimation techniques. Methods such as weighted least square (WLS) in the LISREL package or asymptotically distribution free (ADF) estimation in AMOS become available. The WLS/ADF technique received particular attention due to its insensitivity to non-normality of the data, but it requires a very large sample to yield more consistent techniques. Despite all of these estimation techniques becoming more widely available, MLE continues to be the most widely used approach and it has been proven to be fairly robust to violations of the normality assumption (Henri, 2007). Researchers who compared MLE with other techniques had shown that it produced reliable results in most circumstances (Hair et al., 2006).

3.7.4   Model's Goodness-of-Fit (GOF)

SEM provides a range of fit indices to assess the overall fit of the entire structural model. GOF indicates how well the specified model reproduces the covariance matrix among the indicator items. The basic and most commonly-used fit index reported is the ***chi-square (χ^2) statistic***. With 212 samples analysed in this study, this approach is considered appropriate to be used (Kline, 1998). The difference in the covariance matrices is the key value in assessing the GOF of any SEM model. SEM estimation procedures such as a MLE produce parameter estimates that mathematically minimize this difference in the specified model. A χ^2 test provides a statistical test of the resulting difference.

It is represented mathematically by the following equation:

$$\chi^2 = (N - 1)(S - \textstyle\sum_k)$$

Where N = overall sample size;

S = observed sample covariance matrix;

$\textstyle\sum_k$ = SEM estimated covariance matrix.

The SEM estimated covariance matrix is influenced by how many parameters are free to be estimated (the k in $\sum_k$), so the model degrees of freedom (df) also influence the χ^2 GOF test. The df for an analysis of a covariance structure model is determined by:

$$df = \tfrac{1}{2}\,[(p)(p + 1)] - k$$

Where p = total number of observed variables

k = number of estimated (free) parameters

With the χ^2 GOF test, the smaller the p-value, the greater the chance that observed sample and SEM estimated covariance matrices are not equal. Thus, with SEM, we do not want the p-value for the χ^2 test to be small (or significant). If theory is to be supported by the test, the small χ^2 is needed (and corresponding large p-value; i.e. >0.05), that indicates no statistically significant difference between the matrices. Another problem with χ^2 is that the more complex the model, the bigger the χ^2 will be and the more likely it is that the specified model will be rejected (Holmes-Smith, 2005). For this reason, a ***"normed" χ^2*** is sometimes used where χ^2 is divided by the df (χ^2/df) for the model to give a χ^2 measure per df. The acceptable level for normed χ^2 should be greater than 1.0 but smaller than 2.0 (although values between 2.0 to 3.0 indicate a reasonably good fit). Values of less than 1.0 indicate overfit (Holmes-Smith, 2005).

Other commonly-used fit indices are:

- Goodness of Fit Index (GFI)
    - The GFI is an early attempt to produce a fit statistic that was less sensitive to sample size. The possible range of GFI values is 0 to 1 with higher

values indicating better fit. The common threshold value for GFI (as well as AGFI) is more than 0.95, although values greater than 0.9 also indicate reasonable fit (see Table 3.3 for detail fit values).

- Root Mean Square Residual (RMR) and Standardized Root Mean Square Residual (SRMR)
  - The RMR is an average of the residuals between individual observed and estimated covariance and variance terms. SRMR is the alternative statistic based on residuals. It is a standardized value of RMR and thus is more useful for comparing fit across models. Lower RMR and SRMR value represent better fit. RMR and SRMR are sometimes known as *badness-of-fit* measures in which high values are indicative of poor fit.
  - RMR should be less than 0.05 (Holmes-Smith, 2005).

- Root Mean Square Error of Approximation (RMSEA)
  - RMSEA is a measure that attempts to correct for the tendency of the χ^2 GOF test statistics to reject models with large samples or a large number of observed variables. Lower RMSEA values indicate better fit. Like the SRMR and RMSR, it is a badness-of-fit index. Typically, values of below 0.05 indicate the most acceptable models (although values between 0.05 and 0.08 indicate reasonable fit) (Holmes-Smith, 2005).

- Comparative Fit Index (CFI)
  - The CFI is an incremental fit index that is an improved version of the NFI. The values range between 0 and 1, with higher values indicating better fit (>0.90) (Holmes-Smith, 2005). Because the CFI has many desirable properties including its relative, but not complete, insensitivity to model complexity, it is among the most widely used indices.

- Normed Fit Index (NFI)
  - The NFI is one of the original incremental fit indices. It is a ratio of the difference in the χ^2 value for the fitted model and null model divided by the χ^2 value for the null model. It ranges between 0 and 1 and a model with perfect fit would produce an NFI of 1.

- Model Parsimony
    - The more parameters added to a model the more sample specific the model becomes and less likely it is that the different sample could support such a highly specific model (Holmes-Smith, 2005). The more parsimonious the model, the more likely it is that the model could generalised to the population. Thus, the "best" model is the model with the smallest model parsimony fit measure. Some functions used to measure model parsimony are Akaike Information Criterion (AIC) and Consistent Akaike Information Criterion (CAIC).

According to Hair et al. (2006), multiple fit indices should be used to assess a model's GOF which include:

- The χ^2 value and the associated *df*
- One absolute fit index (i.e., GFI, RMSEA, or SRMR)
- One incremental fit index (i.e., CFI or NFI, etc.)
- One goodness-of-fit index (i.e., GFI, CFI, NFI, etc.)
- One badness-of-fit index (RMSEA, SRMR, etc.)

The ultimate goal for any of these fit indices is to assist the researcher in discriminating between acceptably and unacceptably specified models. Academic journals are replete with SEM results citing a 0.90 value on key indices, such as CFI, NFI, or GFI, as indicating an acceptable model (Hair et al., 2006). Hair et al. (2006) provides some guidelines for using fit indices in different situations (see Table 3.3). The guidelines are primarily on simulation research that considers different sample sizes, model complexity, and degrees of error in model specification. One key point across the results is that, simpler models and smaller samples should be subject to stricter evaluation than are more complex models with larger samples.

3.8   Summary

A survey is chosen in this study due to the fact that the emphasis is on producing a result based on real-world observations. Conducting high quality survey research

requires a set of conditions that are not all within a researcher's control. Conditions like good access to population, uses of common language in addressing research issues, and also the issue of confidentiality appear increasingly difficult to find, not only in management accounting but also other areas of organization research. Therefore, in order to ensure a high quality of the survey design, this study uses a framework suggested by Van der Stede et al. (2007); which includes questionnaire design, the use of pre-testing, follow-up procedures and non-response bias analysis.

Table 3.3
Guidelines for Establishing Acceptable and Unacceptable Fit

Statistics	*N* < 250				*N* > 250		
	m ≤12[10]	12<m<30	m ≥30		m <12	12<m<30	m ≥30
χ^2	Insignificant p-values expected	Significant p-values can result even with good fit	Significant p-values can be expected		Insignificant p-values can result with good fit	Significant p-values can be expected	Significant p-values can be expected
CFI/NFI/ GFI	0.97 or better	0.95 or better	Above 0.92		0.95 or better (do not use with N>1,000)	Above 0.92 (do not use with N>1,000)	Above 0.90 (do not use with N>1,000)
SRMR	Could be biased upward; use other indices	0.80 or less (with CFI of 0.95 or higher)	Less than 0.09 (with CFI above 0.92)		Could be biased upward; use other indices	0.08 or less(with CFI above 0.92)	0.08 or less(with CFI above 0.92)
RMSEA	Values<0.08 with CFI = 0.97 or higher	Values<0.08 with CFI of 0.95 or higher	Values <0.08 with CFI above 0.92		Values <0.07 with CFI of 0.97 or higher	Values <0.07 with CFI of 0.92 or higher	Values <0.07 with CFI of 0.90 or higher

m = number of observed variables; *N* applies to number of observations per group when applying CFA to multiple groups at the same time.

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[10] Data in this study fall within this range.

CHAPTER FOUR

HYPOTHESES DEVELOPMENT

4.1   Introduction

The approach of this study is to consider a theory that explicitly examines different modes of organizational change, (contingency and institutional theory). These theories are used to develop a framework for conceptualizing management accounting and organizational change, which not only stresses the stability embodied in rule-based behaviour and routine of organizational systems and practices, but also recognizes that rules and routines can change (see, Burns & Scapens, 2000; Huy, 2001; Lapsley & Pallot, 2000; J. A. Smith et al., 2005).

An organization is often interpreted as a configuration of different characteristics. Numerous dimensions of external context (such as environments, industries and technologies) and internal organizational characteristics (such as strategies, structures, cultures, processes, practices and outcomes) have been said to cluster into configurations (Moores & Yuen, 2001). In a changing environment, markets have become more competitive, mainly in respect to an increased level of high quality and competitively priced products. Organizations may respond to this change by reorganizing their work processes through adopting organizational design and strategy that have a stronger customer orientation. In order to compete, many organizations made considerable investments in advanced manufacturing technology

such as computer-integrated manufacturing and just in time systems (Baines & Langfield-Smith, 2003), which in turn can increase quality, productivity, flexibility as well as reducing cost.

The institutional approach to organizational change suggests that organizational structures affect an organization's learning strategy and ability to adapt to changes in the external environment. Organizational structural arrangements can be successfully changed through incremental or radical adaptive strategic change (see, Sisaye, 2003). Theories of revolutionary change advocate that all organizational elements such as strategy, structures, people, systems, and culture, have to be changed simultaneously to achieve maximum organizational alignment and effectiveness (Huy, 2001).

Literature has identified that changes in business environment surrounding an organization cause organizational and management accounting practices to change (e.g., Baines & Langfield-Smith, 2003; Chenhall & Morris, 1986; Chong & Chong, 1997; Libby & Waterhouse, 1996; Mia & Clarke, 1999; Pratt, 2004; Waweru et al., 2004). The literature also implies that the relationship between management accounting and organizational change is reciprocal. These relationships are illustrated in the basic model presented in Chapter One (Figure 1.1).

Hypotheses are formulated in this study using the contingent theoretic arguments that changes in management accounting practices and internal operations of organizations are contingent on the "fit" with changes in the external environment that surrounds it. Old institutional economic (OIE) theory perspectives are also used to explain the reverse causation relationship between organizational and management accounting change (known as formal and informal change).

Based on the research questions, this study focuses on the following six areas: the competitive environment, advanced manufacturing technology, organizational structure, organizational strategy, management accounting practices and organizational performance. With respects to the changes in management accounting practices, this study also tests the five management accounting change dimensions developed by Sulaiman and Mitchell (2005):

1. Introduction of new management accounting techniques.
2. Introduction of new techniques as replacements.

3. Modification of the information output of the management accounting techniques.

4. Modification of technical operation of the management accounting techniques.

5. Removal with no replacements (abandonment).

4.2 Changes in Competitive Business Environment and Manufacturing Technology

Environment can be broadly characterized as phenomena that are external to the organization and which have either potential or actual influence on the organization (Macy & Arunachalam, 1995, p.67). The external environment may thus relate to technology, law, politics, economics, culture, and demographics. In this section, hypotheses are developed that examine how changes in competitive environments and advanced manufacturing technology cause changes in organizational structure, organizational strategy and management accounting practices.

4.2.1 Changes in Competitive Environments, Technology and Organizational Structure

Changes in competitive environment and technology put pressure on organizations to adapt and change their structure (Schwarz & Shulman, 2007). In adopting this change, horizontal (decentralized) structures like work-based teams have emerged, (Cohen & Bailey, 1997). It is argued that the use of decentralized structures in a competitive environment and advanced technology development enables organizations not only to improve their speed and flexibility of response, but also to improve the quality of that response. For example, Choe (2004), DeLisi (1990) and Harris (1996) agree that the successful implementation of information technology and computer networks in an organization, as well as the use of a high degree of automation and computer aided technology in the production system, often require the blending of technological and social skill, which can be best achieved through the adoption of work-based teams. Thus, the following hypotheses are proposed:

H_{1a} *Organizations facing a more competitive environment will change to a flatter organizational structure.*

H_{1b} *organizations facing changes in manufacturing technology advancement will change to a flatter organizational structure.*

4.2.2   Changes in competitive environment, technology and organizational strategy

Increasing globalization has resulted in change in the dynamic nature of competition and technology. As a result, strategy development has also had to change (Shields, 1997). In intense and aggressive competition with increased customer demands and a shorter product life cycle, a proper link between strategy and manufacturing operations, are all keys to developing sustainable competitive advantage (Porter, 1996). Customer-focused strategies are of particular interest in this study and it is a form of product differentiation strategy (Hyvönen, 2007). Recently, customer focus has been identified as an important aspect of the strategy of the firm (Hyvönen, 2007; Kaplan & Norton, 1992). This form of strategy provides potential for firms to effectively differentiate their products or services from competitors by satisfying customer demands for product features or for timely and reliable delivery and after sales service (Hyvönen, 2007).

Many companies seek to gain competitive advantage by applying customer-focused strategy, and a customer focus ideology is embedded in many management philosophies, i.e. in total quality management, just-in-time or flexible manufacturing. Li and Ye (1999) found that firms need to make greater investment in information technology if they are in more dynamic environments and are also pursuing more externally oriented strategies involving product market expansion. Information technology is one basis of the application of advanced manufacturing technology, such as just-in-time. Several empirical research studies suggest that the organization should change its strategy to accommodate change in competitive environment and technology. For example, Baines and Langfield-Smith (2003), Chenhall and Langfield-Smith (2003), Harris (1996), and DeLisi (1990) show that firms facing a more competitive environment and technology advancement will change towards a

differentiation strategy, in addition, Fuschs et. al. (2000) found that successful firms aligned key elements of strategy with the environment. Therefore, the following hypotheses are proposed:

> ***H₂ₐ*** *Organizations facing a more competitive environment will change towards a differentiation strategy.*

> ***H₂ᵦ*** *Organizations facing manufacturing technology advancement will change towards a differentiation strategy.*

4.2.3 Changes in competitive environment, technology and management accounting practices

It is argued that with an increase in uncertain environments, managers need specific forms of management accounting information to support their decision needs and to assist them in monitoring progress against strategies. This is supported by a contingency style of management accounting research which assumes that an appropriate fit between the environment and organizational system is needed for management accounting systems to change, and to support managers' new information requirements (see for example, Chenhall, 2003; Gerdin & Greve, 2004; Haldma & Laats, 2002; Lapsley & Pallot, 2000; Waweru et al., 2004).

Literature also suggests that changes in environmental factors surrounding an organization can have a significant impact on its management accounting systems (Baines & Langfield-Smith, 2003; Hoque & James, 2000; Innes & Mitchell, 1995; Libby & Waterhouse, 1996; Scapens, 1999; J. A. Smith et al., 2005; Waweru et al., 2004). For example Waweru et al. (2004) had identified factors which facilitate change in the organizations examined in the face of competition, technology, new shareholders, new customers, new accountants, and poor financial performance. Market competition and technology advancement have been identified as major triggers for management accounting change (Baines & Langfield-Smith, 2003; Libby & Waterhouse, 1996; Waweru et al., 2004).

In response to the changes in competitive environment, it is important for companies to increase focus on production quality and customer service. It had been found that effective and efficient MAS is an important tool for the companies to remain competitive (Hoque et al., 2001). Previous studies found that organizations had changed their MAS to a more effective and efficient systems in order to cope with the high market competition (for example, Baines & Langfield-Smith, 2003; Haldma & Laats, 2002; Hoque et al., 2001).

It is also argued that with the introduction of new technologies in manufacturing operations, the structure of manufacturing costs has changed. Manufacturing technologies, such as computer integrated manufacturing and just in time systems, emphasize the way in which direct labour and inventory are vanishing from the factory, so that speed of operation is determined by the type of automation and manufacturing system used, and not by how fast the operators can work. Consequently, a traditional cost control system itself cannot help managers to manage resources as well as identifying relevant costs. Choe (2004) in his study on Korean manufacturing firms, found a significant positive relationship between the level of advanced manufacturing technology and the amount of information produced by the management accounting information system. This leads to the hypotheses:

> ***H$_{3a}$*** *Organizations facing a more competitive environment will change their management accounting practices.*

> ***H$_{3b}$*** *Organizations adopting advanced manufacturing technology will change their management accounting practices.*

4.3   Changes in Management Accounting Practices

The management of change suggests how management accounting change is intertwined with a changing organizational structure and strategy; these have been the most consistently used organization characteristics and variables in past research (e.g., Chenhall, 2003; Lapsley & Pallot, 2000). Further analysis on change in management accounting practices, organizational structure and strategies are

reviewed below.

4.3.1 Changes in management accounting practices and organizational structure

Literature has revealed that the design of MAS and the control process depend on the context of the organizational setting in which these controls operated. For example Moores and Mula (1993) reported that MAS forms an important part of the information and control systems that reinforce and support basic intent of the formal structure. Abdel-Kader and Luther (2008) suggest that firms confronted with high uncertainty required a decentralised structure and more sophisticated MAS. There are different views as to whether the centralized or decentralized structure is the most prominent structural in designing MAS. However Matejka and De Waegenaere (2000) and Chenhall (2008) both agreed that decentralized organizations tend to implement changes in their management accounting systems in order to link various activities across the organization. However, Verbeeten (2010) found a negative association between decentralize structure and changes in MAS.

Many management accounting innovations associated with the changing nature of operations and competition rely on promoting a high degree of employee involvement, often using work-based teams (Chenhall & Langfield-Smith, 1998a). The role of management accounting in structural change is not simply to deliver cost data, but to provide a service that empowers team members to make the best decision in the light of current changing conditions (Gordon & Miller, 1976). Thus, changing the organization structure, including the use of teams and employee empowerment, will result in changed employer and employee expectations, including increased access to relevant information, particularly, management accounting information (Scott & Tiessen, 1999).

As a consequence, management accounting in an organization is seen to be both one element of organizational structure and also as an outcome of the chosen structure (Luther & Longden, 2001). Gerdin (2005) also agreed that management control subsystems may not only complement each other but also substitute for each other. Thus, it is suggested that management accounting practices and organizational

structure can be changed in both directions. Therefore, the following hypotheses are proposed:

> ***H_{4a}*** *A change in organization structure will result in changes in management accounting practices.*

> ***H_{4b}*** *A change in management accounting practices will result in changes in organization structure.*

4.3.2 Changes in management accounting practices and organizational strategy

In pursuing competitive advantage, organizations may implement management accounting systems that support their particular strategic priorities. This argument is supported by a numbers of empirical findings: for example, Baines and Langfield-Smith (2003) in their study on the antecedents of management accounting change, found a significant relationship between changes in strategy and management accounting practices, while Chenhall and Langfield-Smith (1998b) in their study on the relationship between strategic priorities and management accounting techniques, found that practices such as quality improvement programs and benchmarking can support firms pursuing a differentiation strategy. In addition, Verbeeten (2010) found a positive association between strategies and changes in MAS.

Beside these findings, Perera et al. (2003), suggest a reciprocal relationship between strategy and management accounting practices; they find that transfer pricing policy may be both a result of strategy and an instrument of strategic change. This finding is supported by Kober et al. (2007), who found the existence of a two-way relationship between management control systems and strategy. They also found that the interactive use of management control system mechanisms helps to facilitate change in strategy, and that management control system mechanisms change to match a change in strategy. Thus, the following hypotheses are proposed:

> ***H_{5a}*** *A change in organization strategy will result in changes in management accounting practices.*

H_{5b}   *A change in management accounting practices will result in changes in organization strategy.*

4.4   Impact on Performance

4.4.1   Effect of changes in management accounting practices on performance

There is strong empirical support for the association between management accounting practice and performance, with an increased use of non-financial information. For example, Chenhall and Langfield-Smith (1998b) found greater use of advanced management accounting practices, such as quality improvement programs, benchmarking and activity-based management, in firms that placed a strong emphasis on product differentiation strategies, ultimately resulting in high performance. Perera et al. (1997) found a positive association between the emphasis placed on various forms of management accounting practices in an environment of manufacturing flexibility, and the use of non-financial measures such as defect rates, on time delivery and machine utilization. Ittner and Larcker (1995), and Sim and Killough (1998) both found a significant positive interaction between TQM practices, management accounting information and performance, while Mia and Clarke (1999) found an indirect association between the intensity of market competition and business unit performance through the use of management accounting information. Thus, the following hypothesis is proposed.

H₆   *A change in management accounting practices will result in improved organizational performance.*

4.4.2   Effect of changes in organizational structure on performance

With the increasing use of team based structures, there is an increased need for easily accessible and relevant information at these levels, as well as relevant information for top management to evaluate the operations of the firm. Scott and Tiessen (1999) suggest that non-financial performance measures can form an integral part of the information base necessary for team success. There is evidence of the existence of a

relationship between organizational design and performance: Pratt (2004) found that, increasing employees' involvement in defining and creating their own work group goals as part of the mission and strategy will increase organizational performance; Moores and Yuen (2001) show an increasing need for formal reporting and objective performance evaluation as firms grow both in terms of activities and number of employees in order to achieve long term performance. This leads to the following hypothesis:

> ***H₇*** *A change in organization structures will result in improved organizational performance.*

4.4.3 Effect of changes in organizational strategy on performance

A key component in understanding how operations support strategic priorities and the interdependencies activities across the value chain is the formulation of performance measures designed to coordinate manufacturing decisions and activities to achieve a balanced set of strategic priorities (Chenhall & Langfield-Smith, 1998a). It has been argued that in order to support and evaluate the achievement of strategic advantages, reliance on financial performance measures alone will not necessarily improve financial results, as financial measures only indicate the outcome of past activities which may be no guide to improving future performance Hoque (2004). Davila (2000), and Chong and Chong (1997) established that a greater use of non-financial information for business units following a customer-focused or prospector-type strategy, had a positive impact on performance. On the other hand, Perera et al. (1997) found support for the hypothesized association between customer-focused strategy and the use of non-financial measures, but not for the link to organizational performance. This leads to the final hypothesis in this section:

> ***H₈*** *A change in organization strategy will result in improved organizational performance.*

4.5   Subsidiary Hypotheses

As pointed out earlier, besides testing the changes in management accounting practices as a consequence of the changes in environment, this study also examines the management accounting change dimension. When there is a change in MAP, different type of changes are involved. There are arguments that changes in management accounting practices are not necessarily confined to the introduction of new systems (replacement of the existing system); changes can be in the way management accounting is used (output or operational modification) (Burns et al., 1999; Sulaiman & Mitchell, 2005).

Several researchers have found that replacement of existing techniques and information output modifications are particularly significant (for example, Granlund, 2001; Sulaiman & Mitchell, 2005; Vaivio, 1999). The pilot study reveals that replacement and information output modification are among the choice of the majority of the respondents who change their management accounting techniques. Thus, the following subsidiary hypotheses are developed.

> H_9 *Organizations in a changing environment will not change their management accounting techniques.*

> H_{10} *Organizations in a changing environment will introduce new management accounting techniques in parallel with their existing techniques.*

> H_{11} *Organizations in a changing environment will replace their existing management accounting techniques with the new techniques.*

> H_{12} *Organizations in a changing environment will modify the use of their existing management accounting techniques.*
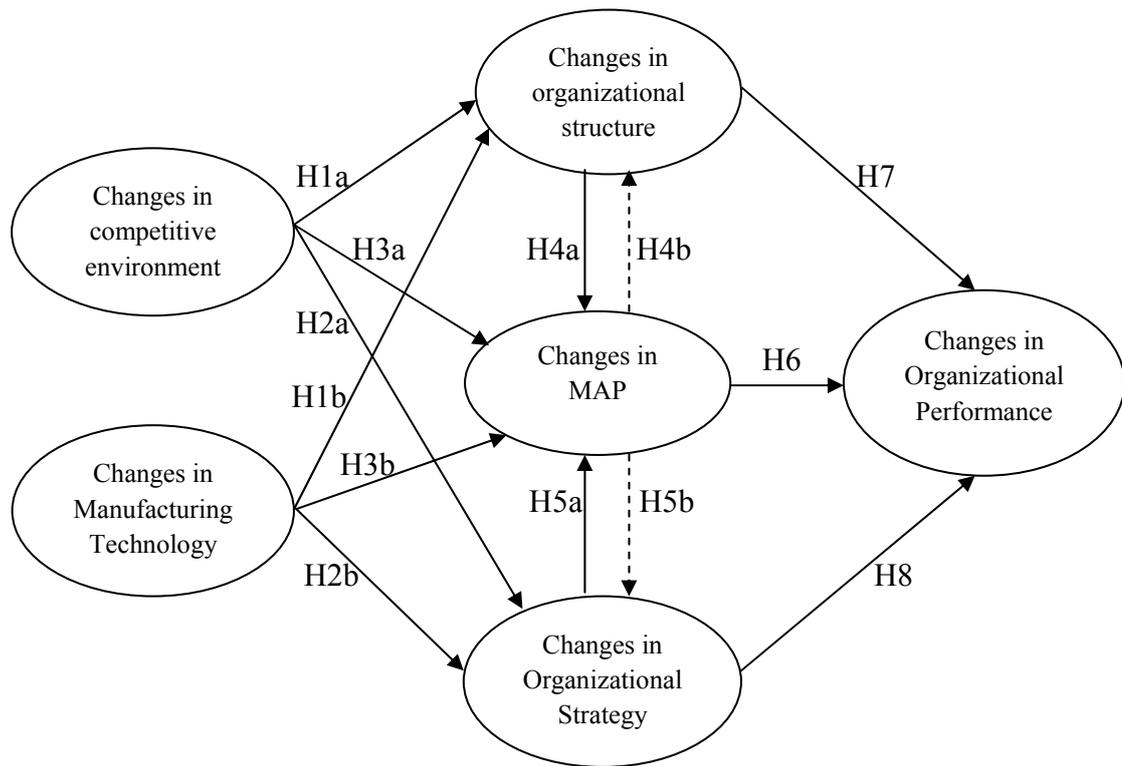
Figure 4.1

Hypothesized Model

4.6   Summary

This chapter provide a concise discussion of the development of hypotheses for this study. Along with the support from the literature, findings from the pilot study together provide a strong basis in developing these hypotheses. The hypothesized model presented in the Figure 4.1 summarizes the developed hypotheses[11].

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[11] The subsidiary hypotheses are not part of the structural model.

CHAPTER FIVE
PILOT STUDY

5.1 Introduction and Background of Pilot Study

A pilot study is conducted prior to the actual research survey based on the 41 manufacturing companies in Malaysian. The main objectives are to confirm the applicability of the variables in Malaysian manufacturing industry and to explore the potential association among the variables in the conceptual framework. The results are also used as a guideline in hypothesis development for the main study. The steps involved in conducting the pilot study are presented in Figure 5.1.

5.2 Research Method

5.2.1 Sampling and Data Collection Procedures

For the pilot study, the sample of 200 manufacturing companies was randomly selected from FMM Directory 2008. The questionnaire was mailed to the companies on November 20th, 2008. Together with the questionnaire, a cover letter and replied paid envelope were included. The cover letter explained the details of the survey, contact information and also the instructions to reply to the survey. In the cover letter, the respondents are also informed that all the information provided will be

treated in the strictest confidence and that only aggregated findings would be reported.

Within one month after the initial mail-out to respondents, out of 200, 41 companies had replied (a response rate of 20.5%). This level of response was considered sufficient for the pilot testing, thus no follow up procedure was carried out.
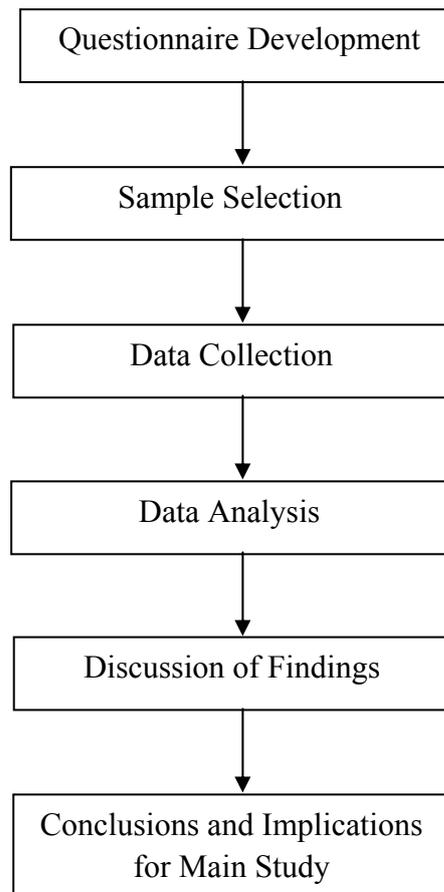
Figure 5.1
Steps Involved in Pilot Study

5.2.2   Research Instruments

The variables measured in this study cover the six areas in the conceptual framework. An 11-point Likert scale is adopted from study by Baines and Langfield-Smith (2003), to capture a decrease change (-5 to -1), no change (0) and an increase

change (+1 to +5). Where relevant, respondents had the opportunity to indicate if the various practices or items had never been used or adopted (indicate as N/A). For the purposes of analysis this scale is coded 1 to 11, where 6 is the point for no change. Any item which is not applicable is treated as a missing value. The items comprising the questionnaire are presented in Table 5.1.

Table 5.1
Items Asked in Questionnaire

	Variables	Indicators
1.	Competitive environment	- Price competition - Competition for new product development - Marketing/distribution channels competition - Competition for markets/revenue share - Competitors' action - No. Of competitors in your market segments
2.	Manufacturing technology	- Robotics - Flexible manufacturing systems (FMS) - Computer aided manufacturing (CAM) - Computer aided design (CAD) - Computer aided engineering (CAE) - Computer aided process planning (CAPP) - Testing machines - Just-in-time (JIT) - Direct numerical control - Computer integrated manufacturing (CIM) - Numerical control (NC)
3.	Organizational structure	- Multi-skilling of workforce - Worker training - Cross-functional teams - Establishing participative value - Management training - Flattening of formal organizational structures - Work-based teams - Employee empowerment - Manufacturing cells
4.	Organizational strategy	- Provide on time delivery - Make dependable delivery promise - Provide high quality products - Provide effective after sales service and support

		-	Make changes in design and introduce quickly
		-	Customize products and services to customer need
		-	Product availability (broad distribution)
		-	Make rapid volume/product mix changes
5.	Management accounting practices	-	Budgetary control
		-	Full/ absorption costing
		-	Cost-volume-profit (CVP) analysis
		-	Variable/ marginal costing
		-	Standard costing
		-	Total quality management (TQM)
		-	Target costing
		-	Activity-based-costing (ABC)
		-	Activity-based-management (ABM)
		-	Value chain analysis
		-	Product life cycle analysis
		-	Benchmarking
		-	Product profitability analysis
		-	Customer profitability analysis
		-	Shareholder value analysis
6.	Organizational performance	-	Operating income
		-	Sales growth
		-	Return on investment (ROI)
		-	Cash flow from operations
		-	Market share
		-	Market development
		-	New market development
		-	Research and development (R&D)
		-	Cost reduction programs/ cost control
		-	Personnel development
		-	Workplace relations
		-	Employee health and safety

5.2.3 Data Analysis

In order to test the applicability of the variables and to explore the potential association among the variables, data is analysed using descriptive statistics and correlation coefficients. Before the data is further tested, it is important to test for the validity and reliability of the instruments used.

In order to enhance the validity and reliability of the measures, the instruments used in this study were adopted from the previous expert studies in this field (Askarany & Smith, 2008; Baines & Langfield-Smith, 2003; Hoque et al., 2001). However, since no advanced statistical analysis was to be performed on this pilot study data, the measure of reliability for the overall items was deemed appropriate. In this case, Cronbach's alpha is used to test the internal consistency reliability.

From the analysis, Cronbach's alpha obtained was 0.97 which was deemed good. The lenient cut-off of 0.60 is common in exploratory research, but, alpha should be at least 0.70 or higher in order to retain an item in an "adequate" scale. However, many researchers require a cut-off of 0.80 for a "good scale". Thus, an alpha of 0.97 obtained in these instruments is considered an excellent outcome.

5.3   Results and Discussion

As discussed in the previous chapter, research instruments in this study were adopted from the research conducted in developed countries, thus it is important to ensure that all of these variables are applicable to Malaysian manufacturing industries. Other than that, results from this pilot study are also used to help in the development of hypotheses. To achieve this, the potential association among the variables is tested.

The previous section details the way in which the respondents were asked whether changes had occurred in the competitive environment, manufacturing technology, management accounting practices, organizational structure, strategy and performance of their firm during the five year period from 2003 to 2007. The data in Table 5.2 shows the overall mean of changes in competitive environment, advanced

manufacturing technology (AMT), management accounting practices (MAP), organizational structure, strategy and performance (9.09, 7.83, 8.48, 8.55, 8.94 and 8.00 respectively). These results indicate that manufacturing companies in Malaysia had placed a greater emphasis in their competition and technological advancement. A high mean value also indicates that management accounting practices, organizational structure, strategy and performance in these companies have changed in a positive way. Details of the results for each of the variables are discussed in the next subsections.

Table 5.2
Descriptive Statistics for Main Variables

Variable	Average Mean	SD
Competitive Environment	9.09	1.23
Advanced Manufacturing Technology (AMT)	7.83	1.14
Management Accounting Practices	8.48	1.00
Organizational Structure	8.55	0.99
Organizational Strategy	8.94	1.17
Organizational Performance	8.00	1.57

(Likert scale of 1to11: 1-5 = decrease change, 6 = no change, 6-11 = increase change)

In order to accomplish the first objective of the pilot study, descriptive statistics are used. This method is considered the most appropriate as only the frequencies and mean score of the data are used to test whether the variables are relevant or not in the Malaysian manufacturing environment.

5.3.1   Competitive Environment

The descriptive statistics for all predictors' variables in competitive environment are presented in Table 5.3. As shown in this table, more than 80% of the respondents report an increase in competitive environment over the five year period (2003-2007). Only a minimal number of respondents (less than 8%) report a decrease in competition, and the same percentage indicates that there were no changes in their organization. Overall, the result indicates that manufacturing companies in Malaysia

responded positively to the change in competitive environment (overall mean = 9.09).

Table 5.3
Change in Competitive Environment (N = 41)

Change in Competitive environment	Decrease Change (%)	No Change (%)	Increase Change (%)	Mean	SD	N/A (%)
Price	7.3	2.4	90.3	9.29	1.75	-
New product development	4.8	4.9	83.0	8.71	2.22	7.3
Marketing/distribution channels	-	4.9	95.1	9.05	1.43	-
Markets/revenue share	-	2.4	97.6	9.56	1.18	-
Competitors' action	2.4	7.3	90.3	9.15	1.67	-
No. Of Competitors	4.8	-	92.8	8.80	2.09	2.4
Average	-	-	-	9.09	1.23	-

(Likert scale of 1to11: 1-5 = decrease change, 6 = no change, 6-11 = increase change)

5.3.2   Technological Development

Table 5.4 presents descriptive statistics for all variables in AMT. The result shows that most of the respondents have positively changed their manufacturing technology to a more advanced technology. However, the result indicates an almost 50-50 split between those respondents who adopted AMT and those who do not. Few respondents reported a decrease in change or no change in the use of AMT (decrease change <8%, no change <15%).

Table 5.4
Change in AMT (N = 41)

Technological Change	Decrease Change (%)	No Change (%)	Increase Change (%)	Mean	SD	N/A (%)
Robotics	7.2	7.3	48.8	7.62	2.43	36.6
FMS	4.9	12.2	51.2	7.82	1.72	31.7
CAM	4.8	12.2	56.2	7.87	1.99	26.8
CAD	4.8	12.2	46.4	7.92	1.35	36.6
CAE	7.2	7.3	36.7	7.14	2.22	48.8
CAPP	7.2	2.4	58.7	7.68	2.12	31.7
Testing machine	2.4	7.3	63.3	8.67	1.90	26.8
JIT	2.4	2.4	75.7	8.39	1.60	19.5
Direct NC	-	14.6	41.5	7.83	1.43	43.9
CIM	4.8	7.3	51.3	7.65	1.89	36.6
NC	2.4	14.6	34.2	7.52	1.91	48.8
Average	-	-	-	7.83	1.14	-

(Likert scale 1to11: 1-5 = decrease change, 6 = no change, 6-11 = increase change)

Even though majority of the respondents report an increase in the used of AMT, the result shows the extent to which the use of particular forms of AMT are not really high during the past five years (overall mean = 7.83). Furthermore, the result also indicates that 20% to 49% of the respondents do not use a particular AMT in their organization. Computer aided engineering (CAE) and numerical controls (NC) are the most unpopular technologies for Malaysian manufacturing companies, while the just-in-time (JIT) system is the most popular (76%).

5.3.3 Organizational Structure

Table 5.5 below, details the descriptive statistics for variables in organizational structure:

Table 5.5

Change in Organizational Structure (N = 41)

Structural Change	Decrease Change (%)	No Change (%)	Increase Change (%)	Mean	SD	N/A (%)
Multi-skilling	4.8	7.3	87.9	8.32	1.86	-
Worker training	4.8	4.9	90.3	8.83	1.53	-
Cross-functional teams	2.4	2.4	87.9	8.87	1.23	7.3
Establishing participative value	-	7.3	85.4	8.47	1.29	7.3
Management training	4.8	4.9	90.3	8.73	1.83	-
Flattening of formal organizational structure	2.4	12.2	83.0	8.25	1.51	2.4
Work-based teams	-	9.8	85.3	8.62	1.39	4.9
Employee empowerment	2.4	7.3	90.3	8.68	1.67	-
Manufacturing cells	-	7.3	78.1	8.20	1.28	14.6
Average	-	-	-	8.55	0.99	-

(Likert scale of 1to11: 1-5 = decrease change, 6 = no change, 6-11 = increase change)

The result shows that around 80% or more of responding organizations have increasingly changed to a more flatten structure within the five year period. This evidence show that manufacturing companies in Malaysia have changed towards a horizontal structure (decentralization). Worker training, management training and employee empowerment are reported as the most important variables in the organization structure (90.3%).

Less than 5% of the respondents indicate a decrease change in their organizational structure and less than 13% of them reported that there is no change. Furthermore, except for manufacturing cells (14.6%), less than 8% of responding organizations indicate that particular organizational structures are not in practice in their organization (cross-functional teams, establishing participative value, flattening of formal organizational structure and work-based teams). Overall, organizational

structures in sample manufacturing companies in Malaysia has positively changed towards a more flatten structure within the past five year period (average mean score = 8.55).

5.3.4 Organizational Strategy

The literature has identified "strategy" as the most important aspect in any organization for survival. This is evident in the result presented in Table 5.6. The majority of respondents reported an increase emphasis in their organizational strategy. The very high percentages in the increase in change column above are indicative of the high use of differentiation strategies in manufacturing companies. The results also indicate that the differentiation strategies are emphasized more in these organization (e.g., on time delivery = 95.8%, dependable delivery promise = 97.6%). Apart from that, less than 8% of respondents reported a decrease in change and less than 10% (except for change in design and introduce quickly = 14.6%) indicates no change in their strategic emphasis.

Except for rapid volume/product mix changes (17.1%), less than 13% of respondents have reported that certain strategic items are not emphasized at all in the organization. Among these items, dependable delivery promise strategy is indicated as the most important strategy as it is applicable to all of the responding companies. All in all, strategic change in manufacturing companies in Malaysia is increasingly emphasized in the past five year period (average mean score = 8.94).

Table 5.6
Change in Organizational Strategy (N = 41)

Strategic Change	Decrease Change (%)	No Change (%)	Increase Change (%)	Mean	SD	N/A (%)
On time delivery	-	2.4	95.2	9.55	1.52	2.4
Dependable delivery promise	-	2.4	97.6	9.32	1.37	-
High quality products	-	2.4	95.2	9.93	1.21	2.4
Effective after sales services	2.4	9.8	82.9	9.13	1.89	4.9
Change in design and introduce quickly	2.4	14.6	70.8	8.33	1.82	12.2
Customize products to customer need	2.4	2.4	87.9	9.11	1.61	7.3
Product availability	-	2.4	85.4	9.17	1.23	12.2
Rapid volume/product mix changes	-	7.3	75.6	8.82	1.38	17.1
Average	-	-	-	8.94	1.17	-

(Likert scale of 1to11: 1-5 = decrease change, 6 = no change, 6-11 = increase change)

5.3.5 Management Accounting Practices

Descriptive statistics for change in management practices are presented in Table 5.7 and a frequencies table for changes in technical level in management accounting techniques are presented in Table 5.8. The average mean score of 8.48 shows that manufacturing companies in Malaysia used most of the management accounting techniques listed in table. The results presented in Table 5.7 show a higher percentage of use of traditional management accounting techniques. Budgetary control which is used in all responding companies shows an increase in used relative to others (92.7%). The result is consistent with Omar et al. (2004), who found that

manufacturing companies in Malaysia, especially local companies, are still largely focused on the use of traditional management accounting techniques.

Table 5.7
Change in MAP (N = 41)

Change in MAP	Decrease Change (%)	No Change (%)	Increase Change (%)	Mean	SD	N/A (%)
Budgetary control	2.4	4.9	92.7	9.17	1.58	-
Full/absorption costing	2.4	9.8	65.8	8.84	1.74	22.0
CVP analysis	2.4	7.3	78.1	8.47	1.54	12.2
Variable/marginal costing	4.9	4.9	73.1	8.82	1.66	17.1
Standard costing	-	14.6	80.5	8.79	1.66	4.9
TQM	2.4	9.8	63.4	8.81	1.85	24.4
Target costing	2.4	9.8	61.0	8.17	1.53	26.8
ABC	12.2	14.6	46.4	7.47	2.14	26.8
ABM	12.2	12.2	36.6	7.24	1.98	39
Value chain analysis	2.4	17.1	53.7	7.70	1.46	26.8
Product life cycle analysis	2.4	17.1	48.8	7.86	1.67	31.7
Benchmarking	-	7.3	80.5	8.75	1.57	12.2
Product profitability analysis	-	2.4	95.2	9.50	1.15	2.4
Customer profitability analysis	2.4	9.8	70.7	8.91	1.67	17.1
Shareholder value analysis	-	9.8	73.1	8.68	1.53	17.1
Average	-	-	-	8.48	1.01	-

(Likert scale of 1to11: 1-5 = decrease change, 6 = no change, 6-11 = increase change)

Furthermore, the result also shows that, the most popular traditional management accounting techniques used are standard costing (N/A=4.9%) and variable/ marginal costing (N/A=17.1%), where as full/ absorption costing indicates a contra result (N/A = 22%). The most popular advanced management accounting techniques used is product profitability analysis and benchmarking. 95.2% and 80.5% of the respondents respectively, reported an increase used in these two techniques. Interestingly, ABC and ABM show a highest decrease in change with 12.2%. Only 46.4% of responding companies report an increase used in ABC. This is contradict with the literature, where ABC is found as an important accounting innovations in a changing organization (for example, Chenhall & Langfield-Smith, 1998a; Gosselin, 1997).

Table 5.8 below presents frequencies for management accounting change dimensions in respondents' company. The result shows that a majority of the responding companies have not changed in their use of management accounting techniques (42.9%). Excluding this group, the most commonly occurring change is as a replacement (18.3%) and as information output modification (18%). This result is consistent with Sulaiman and Mitchell (2005). The fourth rank is introduction of new techniques (11.3%). Changes occurring in modification of technical operation and removal with no replacement show the lowest percentages (5.3% and 4.2% respectively).

Table 5.8
Management Accounting Change Dimensions (N = 41)

Dimensions of Change	Responses (%)	Rank
No change	42.9	1
Introduction of new techniques	11.3	4
Introduction of new techniques as replacements	18.3	2
Modification of the information/output of the MAS	18.0	3
Modification of technical operation of the MAS	5.3	5
Removal with no replacement (abandonment)	4.2	6
Total	100.0	

5.3.6 Organizational Performance

Details of the changes in organizational performance variables are presented in Table 5.9.

Table 5.9
Change in Organizational Performance

Change in Performance	Decrease Change (%)	No Change (%)	Increase Change (%)	Mean	SD	N/A (%)
Operating income	19.5	4.9	73.2	7.83	2.42	2.4
Sales growth	12.1	7.3	78.2	8.30	2.13	2.4
ROI	14.7	7.3	73.1	7.59	1.84	4.9
CF from operations	17.1	9.8	68.2	7.69	2.18	4.9
Market share	12.2	12.2	70.7	8.08	2.18	4.9
Market development	9.7	9.8	78.1	8.02	1.76	2.4
New product development	9.7	12.2	75.7	7.75	1.96	2.4
R&D	9.7	22.0	63.4	7.72	2.08	4.9
Cost reduction program	9.7	9.8	78.1	8.00	2.01	2.4
Personnel development	2.4	4.9	87.8	8.18	1.39	4.9
Workplace relations	2.4	12.2	80.5	8.26	1.55	4.9
Employee health	-	9.8	85.3	8.54	1.45	4.9
Average	-	-	-	8.00	1.57	-

(Likert scale of 1to11: 1-5 = decrease change, 6 = no change, 6-11 = increase change)

The result show that financial and non-financial performance measurement are both employed by sample companies (range of positive change from 73% to 78%, except for R&D=63.4%). This result is consistent with the arguments that multiple performance measures are needed because the use of traditional (financial) performance measures alone not enough to measure performance for organizations operating in highly competitive and advanced technology environments (Hoque et al., 2001). Only 2% to 5% of the responding companies indicate that a certain performance measurement is not being used in the organization. Interestingly, 19.5%

of the respondents reported a decrease in the use of operating income as one of their performance measurement indicator. This might be due to the reduced relevance of this measurement in a highly competitive environment. Overall, respondents indicated that their performance has increased as compared to their competitors over the past five year period (average mean score = 8.00).

Other than descriptive statistics, correlation coefficients are used to measure the potential association among the variables within the conceptual model (second objective). Moreover, this analysis is conducted to support the hypotheses developed in this study (see Chapter 4).

5.3.7 Correlation Matrix for Operational Measures

Pearson correlation coefficients for pairs of operational variables are presented in Table 5.10. As can be seen from the table, changes in organizational structure, strategy and management accounting practices are positively and significantly associated with the changed competitive environment ($r = 0.55$, $p<0.01$; $r = 0.72$, $p<0.01$; $r = 0.47$, $p<0.01$). These three variables also have a positive significant association with changes in manufacturing technology ($r = 0.53$, $p<0.01$; $r = 0.58$, $p<0.01$, $r = 0.59$, $p<0.01$). Furthermore, changes in organizational structure and strategy are positively and significantly associated with changes in management accounting practices ($r = 0.58$, $p<0.01$; $r = 0.73$, $p<0.01$).

The correlation coefficients for changes in organizational strategy and organizational performance showed a positive significant association ($r = 0.41$, $p<0.01$). Additionally, changes in organizational structure and management accounting practices are marginally significant and related with organizational performance ($r = 0.33$, $p<0.05$; $r = 0.36$; $p<0.05$). The correlations between changes in competition and manufacturing technology with performance are positive but not significant.

These results are consistent with the literature review presented in Chapter Two. In response to the changes in competitive environment and manufacturing technology, organizations are tending to change their design, strategy and MAP in maintaining and/or improving performance. Thus, the alignments between these three

organizational factors (structure, strategy and MAP) are essential in order to achieve a superior outcome.

Table 5.10
Correlation Matrix (N = 41)

Variables	COMP	AMT	STRUC	STRAT	MAP	PERF
COMP	1					
AMT	0.32*	1				
STRUC	0.55**	0.53**	1			
STRAT	0.72**	0.58**	0.68**	1		
MAP	0.47**	0.59**	0.58**	0.73**	1	
PERF	0.14	0.18	0.33*	0.41**	0.36*	1

*Significant level at $p<0.05$ (1-tailed).

**Significant level at $p<0.01$ (1-tailed).

Definitions of Variables:

COMP = change in competitive environment; AMT = change in advanced manufacturing technology; STRUC = change in organizational structure; STRAT = change in organizational strategy; MAP = change in management accounting practices; PERF = change in organizational performance.

5.4 Conclusions and Implications for the Main Study

The findings from this pilot study shed light on the intensity of management accounting and organizational change in Malaysian manufacturing industries. The descriptive analysis shows that a majority of the responding companies had reacted positively to changes in competitive business environment and advanced manufacturing technology. The results also show positive changes in MAP, organizational structure and strategy. The results from the analysis of correlation coefficients show that associations among MAP, structure and strategy are both positive and significant. Positive significant relationships are also found among MAP, structure and strategy with competitive environment, AMT as well as performance.

Besides the changes in MAP, this study has also analysed the dimensions of change in MAP. It is found that most of the responding companies have not changed in the

way they use their management accounting techniques. The majority of respondents, who had made the changes, choose to replace the existing techniques, modify the information output and introduce new techniques. Few of them reported changes in technical operations leading to abandonment. This result supports a finding by Sulaiman and Mitchell (2005), where they found that replacement of existing techniques and information output modifications have a relatively high frequency and importance in Malaysian manufacturing companies.

The results obtained in this study are consistent with the previous studies which suggest that competitive environment and technology are determinants of organizational and management accounting change (for example, Baines & Langfield-Smith, 2003; Hoque et al., 2001). This study also provides evidence that even though the variables used in this study are adopted from studies conducted in developed countries they are also applicable to the Malaysian manufacturing environment. Indirectly this result supports an argument that, although Malaysia is a developing country, its manufacturing industries are more concentrated than those of most of other developed countries (Bhattacharya, 2002). Hence, the instruments used in this pilot study are further used for the main research survey. The positive and significant results from the correlation coefficients analysis also provide support for the structural model presented in Chapter One, as well as the hypotheses development.

CHAPTER SIX

DATA ANALYSIS AND HYPOTHESES TESTING

6.1 Introduction

The research framework and methodology developed to meet the objectives of this study have been presented in the previous chapters. The main objective is to investigate how the alignment of the changes in management accounting practices, with the changes in internal organizational factors (namely strategy and structure), in changing business environment, and the impact on performance. As mentioned in the earlier chapters, variables used in this study originate from the various studies conducted in developed countries. Thus the pilot test had been carried out in order to ensure that these variables can be applied in the Malaysian manufacturing environment. The pilot study was also conducted in order to explore the potential association among the variables in the conceptual framework. Results from the pilot test presented in the previous chapter permit further analysis for the variables.

This chapter presents the work on data analysis. The structural equation modelling (SEM) using LISREL Version 8.80 was used to analyse the hypothesized model in this study. The data were also analysed using descriptive statistics and correlation coefficients using SPSS Version 17.0. This chapter comprises eight sections: Section two below presents the analysis on response and non-response bias, followed by the profile of the responding companies using the descriptive statistics in section three.

Analysis on reliability and validity of measurements is presented in section four. Section five describes the correlation matrix among the hypothesized variables, and the analysis for structural model and hypotheses testing are discussed in section six. Section seven presents an analysis of the subsidiary hypotheses. A summary of the key findings is highlighted in the last section.

6.2   Response and Non-Response Bias

Data were collected using a mail survey. If respondents cooperate and give truthful answers, the survey is likely to accomplish its goal. However, if this condition is not met, two problems might arise, i.e. response and non-response bias. It is important to make sure that the data are free from these types of error in order to ensure that the analysed data will produce valid and reliable results.

Response bias is a survey error that occurs when respondents tend to answer questions in a certain direction which causes them to misrepresent the truth (Zikmund, 2003). Non-response error is the statistical difference between a survey that includes only those who responded and a perfect survey that would also include those who failed to respond (Zikmund, 2003). To utilize the result, researcher must be sure that those who responded to the questionnaire were representative of those who did not.

Even though sample bias did not appear to be problematic (Zikmund, 2003), a procedure was utilized to check this error. The sample was divided into two groups according to early and late responses. Completed questionnaires received after the initial posting were considered as early responses and those which were received after the second reminder, were considered as late responses. As shown in Table 6.1, results on descriptive statistics show no significant differences between the two groups of respondents. It indicated that the samples are representative and respondents' error is not an issue in this research.

Table 6.1
Descriptive Statistics
Early (n=62) and Late (n=65) Respondents

Variables	Mean	Standard Deviation	Range	
			Min	Max
Number of Employees				
Early Respondents	100-500	<100	<100	>1000
Late Respondents	100-500	<100	<100	>1000
Changes in Market Competition				
Early Respondents	8.9	1.2	6.7	11.0
Late Respondents	9.0	1.1	6.3	11.0
Changes in AMT				
Early Respondents	6.8	2.0	3.8	10.0
Late Respondents	7.2	2.3	1.5	10.1
Changes in organization structure				
Early Respondents	8.3	1.0	6.4	9.5
Late Respondents	8.5	1.3	6.3	10.3
Changes in organization strategy				
Early Respondents	8.8	1.1	6.0	10.0
Late Respondents	8.7	1.2	6.5	11.0
Changes in MAP				
Early Respondents	8.4	1.1	6.0	10.3
Late Respondents	8.2	1.2	5.8	10.0
Changes in organization performance				
Early Respondents	7.9	1.6	4.3	10.1
Late Respondents	7.9	1.8	3.4	10.8

6.3   Profile of Responding Companies

A profile of the participating organizations is presented in Table 6.2 and Figures 6.1.
Detailed descriptive statistics for demographic information are presented in
Appendix B.

6.3.1 Industry classification

As can be seen from Table 6.2, the majority of the respondents are from the electrical and electronics industry (26.9 percent); followed by basic metal products (10.8 percent), food processing (9.4 percent), machinery and equipment (7.1 percent), petrochemical and rubber products (both are 6.6 percent). Companies from other industries are ranged between 1.4 to 4.2 percent in terms of their level of responses.

Table 6.2
Industry Classification

	Frequency	Percent	Valid Percent	Cumulative Percent
Electrical and electronics	57	26.89	26.89	26.89
Engineering Supporting	3	1.42	1.42	28.3
Food Processing	20	9.43	9.43	37.74
Life Sciences	3	1.42	1.42	39.15
Machinery and equipment	15	7.08	7.08	46.23
Petrochemical and polymer	14	6.6	6.6	52.83
Rubber products	14	6.6	6.6	59.43
Transport equipment	3	1.42	1.42	60.85
Basic metal products	23	10.85	10.85	71.7
Wood based	2	0.94	0.94	72.64
Publishing	3	1.42	1.42	74.06
Shipping	3	1.42	1.42	75.47
Information technology	8	3.77	3.77	79.25
Automotive	9	4.25	4.25	83.49
Paints & coatings	6	2.83	2.83	86.32
Fertilizers	6	2.83	2.83	89.15
Stationery	3	1.42	1.42	90.57
Plastic	6	2.83	2.83	93.4
Yachts builders	3	1.42	1.42	94.81
Cosmetics and toiletries products	6	2.83	2.83	97.64
Chemicals	5	2.36	2.36	**100**
Total	**212**	**100**	**100**	

Out of various industries engaged in this study, 68 percent of them are local companies, only 32 percent of the respondents are foreign companies operated in Malaysia. Out of 212 companies participated in this research, 51 percent of them produce their products mainly for industrial supply, 40 percent produce consumer products, and another 9 percent of the respondents produce their products for both consumer and the industries supplies. Detail of the sample distribution by sectors is presented in appendix B-1.

6.3.2 Company Size

The sample in this study embraces from small and large companies. The Small and Medium Enterprise Corporation Malaysia (SME Corp. Malaysia) defines small companies as the companies having employees of equal to or less than 50, whereas the companies which have employees of between 51 to 150 are designated as medium size. Companies having more than 150 employees are considered as big companies.
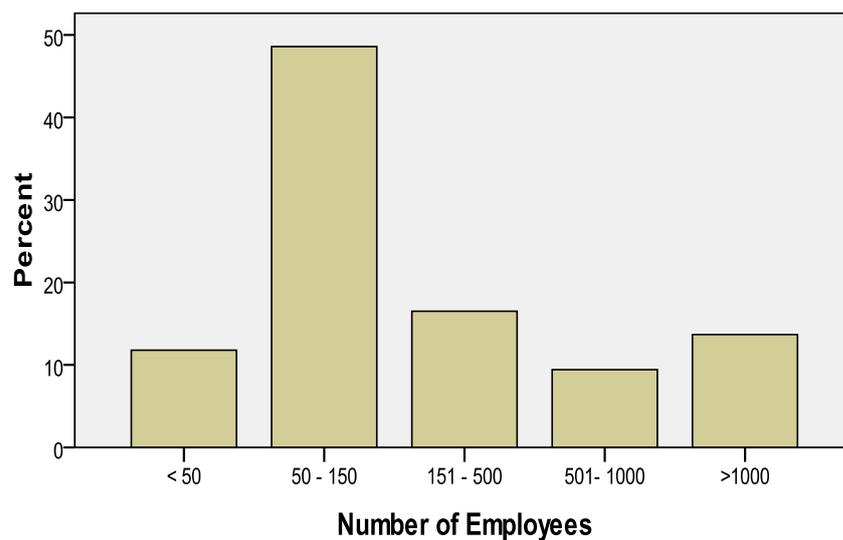
Figure 6.1
Company Size

According to Figure 6.1, the number of employees for these participating companies ranged from as low as less than 50 to in excess of 1,000 employees. The majority (48 percent) indicated that the total number of employees was ranged from 50 to 150, which are designated as medium-sized organizations. 12 percent of the responding companies were small companies (less than 50 employees), and the balance are considered as big companies, with 14 percent of them have more than 1,000 employees. Detailed of demographic statistics is presented in appendix B-2.

6.4 Exploratory Data Analysis and Reliability and Validity of the Measurements

The main objective of this study is to utilize Structural Equation Modelling (SEM) to examine whether the alignment among the environmental factors with the management accounting and organizational change have an impact on performance. Before proceeding with the analysis using SEM, the exploratory data analysis and validity and reliability tests were conducted. This is to ensure that the data fulfilled the requirements for SEM analysis.

Exploratory data screening (EDS) is important in order to purify data prior to the SEM analysis. EDS was conducted using descriptive statistics to ensure that the data had been entered correctly, and that any missing values had been replaced using mean substitution. However, any response which has missing items of more than 40% is considered as incomplete, and is thus excluded from the analysis (refer Table 3.1, page 70). This is essential because SEM requires that there be no missing values in the input data. SEM assumptions are similar to multiple linear regression analysis; the important assumptions are linearity, normal distribution of the variables and low multicollinerity.

Internal consistency for each construct is identified based on Cronbach's alpha. Results from the analysis show that all of the constructs have a Cronbach's alpha value of more than 0.80, which is deemed satisfactory (see Table 6.3 to 6.8). Since there are many variables for each construct, exploratory factor analysis (EFA) is conducted. The purpose of EFA is to explore and summarise the underlying

correlation structure for the data set as well as to simplify the data by revealing a smaller number of underlying factors. It helps to eliminate redundant, unclear as well as irrelevant variables. All items in each construct will be measured as a single construct for hypotheses testing. Detailed results on the descriptive statistics and reliability tests of each construct are presented in the following subsections.

6.4.1 Competitive Environment

Table 6.3 below details the descriptive statistics, factor loadings, reliability, and validity tests for all of the variables in competitive environment.

Table 6.3
Results of Descriptive Statistics and Reliability and Validity
(Competitive Environment)

List of Constructs and Measures	Mean	SD	Factor Loading
Cronbach's alpha = 0.81			
AVE = 0.50			
1. Competitors action	9.17	1.49	0.84
2. Marketing/distribution channels competition	8.95	1.48	0.80
3. Competition for markets/revenue share	9.39	1.24	0.79
4. No. Of competitors in market segments	8.90	1.70	0.70
5. Price competition	9.31	1.68	0.63
6. Competition for new product development	8.84	1.84	0.59
TOTAL			
	9.09		

(Likert scale of 1to11: 1-5 = decrease change; 6 = no change; 7-11 = increase change)

The results show high mean value for all variables (more than 8.0), which shows that competitive environment in Malaysian manufacturing industries has been significantly increased over the past five years. The areas of greatest increase in competitiveness relate to competition for market/ revenue share (mean = 9.39), price competition (mean = 9.31) and competitors action (mean = 9.17). High mean values are also an indicator of the uneven data distribution. The skewed data indicated that the variables were not normally distributed[12].

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[12] Detailed result of the Skewness and Kurtosis test for all items is presented in Appendix C.

Factor analysis shows that all six items in this variable represent a single factor loading. High factors loadings (>0.50) with the Cronbach's alpha of 0.81 and an average variance extract (AVE) of 0.50, indicated that the measures for competitive environment were valid and reliable for further analysis.

6.4.2 Advanced Manufacturing Technology (AMT)

Descriptive statistics for AMT in Table 6.4 below indicate a high mean value for each of the measures (>7.0). It shows a significant increased in the use of AMT in Malaysian manufacturing industry in the five years period from 2003 to 2007 (mean = 7.66). The technologies that contribute to the increased in AMT are testing machines (mean = 8.46) and JIT (mean = 8.31). High mean values, however also indicate that this variable is not normally distributed. Apart from a violation of the normality assumption, results from the analysis show that the measures for AMT are valid and reliable.

Table 6.4
Results of Descriptive Statistics and Reliability and Validity
(AMT)

Variables	Mean	SD	Factor Loadings	
			1	2
Cronbach's alpha = 0.93				
AVE = 0.66				
1. Computer aided process planning (CAPP)	7.60	2.03	0.89	
2. Computer aided engineering (CAE)	7.22	1.20	0.87	
3. Computer aided design (CAD)	7.66	2.18	0.84	
4. Computer aided manufacturing system (CAM)	7.74	1.95	0.75	
5. Computer integrated manufacturing (CIM)	7.63	1.83	0.74	
6. Testing machines	8.46	1.97	0.81	
7. Numerical control	7.48	1.92	0.78	
8. Just-in-time	8.31	1.73	0.56	
9. Robotics	7.44	1.81		0.89
10. Flexible manufacturing system (FMS)	7.80	1.55		0.84
11. Direct numerical control	7.44	1.57		0.62
TOTAL	**7.66**			

(Likert scale of 1to11: 1-5 = decrease change; 6 = no change; 7-11 = increase change)

A high Cronbach's alpha (0.93) shows reliable measures of the variable, whereas factor loadings of more than 0.5 and AVE of 0.66 indicate the validity of the measures. As can be seen from Table 6.4 below, measurement items for AMT were loaded into two factors. As for the further analysis, all of these items were combined together in one composite score.

6.4.3 Organizational Structures

Mean values for items in organizational structures were in the ranged of 8.2 to 8.9 (see Table 6.5). It showed that these organizations had changed their design to a flatter structure during the period of study (mean = 8.50). Worker training is the highest practices that contribute to the significant increased in flat organization structure (mean = 8.90). However, the normality test for this variable showed a non-normal distribution. Despite the non-normal data distribution, this variable was reliable and valid for further analysis (Cronbach's alpha = 0.89, AVE=0.56). Factor analysis showed that the items in this variable were divided into two dimensions, with high factor loadings (>0.5). These items were merged into a composite variable for further analysis.

Table 6.5
Results of Descriptive Statistics and Reliability and Validity
(Organizational Structures)

List of Constructs and Measures	Mean	SD	Factor Loadings	
			1	2
Cronbach's alpha = 0.89				
AVE = 0.56				
1. Manufacturing cells	8.22	1.42	0.84	
2. Work-based teams	8.45	1.50	0.81	
3. Employee empowerment	8.58	1.57	0.80	
4. Flattening of formal organizational structures	8.10	1.51	0.67	
5. Multi-skilling of workforce	8.49	1.61		0.85
6. Worker training	8.90	1.46		0.73
7. Management training	8.68	1.63		0.51
8. Cross-functional teams	8.67	1.40		0.73
9. Establishing participative culture	8.62	1.42		0.67
TOTAL	**8.50**			

(Likert scale of 1to11: 1-5 = decrease change; 6 = no change; 7-11 = decrease change)

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6.4.4 Organizational Strategy

Table 6.6 below summarizes the result from descriptive statistics, reliability, and validity test for organizational strategy.

Table 6.6
Results of Descriptive Statistics and Reliability and Validity
(Organizational Strategy)

Variables	Mean	SD	Factor Loadings	
			1	2
Cronbach's alpha = 0.90				
AVE = 0.58				
1. Make changes in design & introduce quickly	8.45	1.78	0.84	
2. Customize products & services to customer need	9.04	1.47	0.83	
3. Product availability (broad distribution)	8.88	1.52	0.72	
4. Provide effective after sales service & support	9.09	1.70	0.67	
5. Make rapid volume/product mix changes	8.66	1.49	0.62	
6. Provide on time delivery	9.53	1.47		0.90
7. Provide high quality products	9.74	1.43		0.84
8. Make dependable delivery promise	9.22	1.49		0.84
TOTAL	**9.07**			

(Likert scale of 1to11: 1-5 = decrease change; 6 = no change; 7-11 = increase change)

The results indicate that each of the various aspect of differentiation strategy were considered to have changed significantly over the past five years (mean = 9.07). In particular, high quality products, on time delivery, dependable delivery promise, after sales service and product customization strategy. High mean values, together with other normality tests indicated that the data was not normally distributed. Cronbach's alpha of 0.92 showed a reliable set of measures for this construct. Factor analysis showed that the measures were divided into two factors loading. Factor loadings of more than 0.5 and AVE of 0.58 indicated validity of the measures. For further analysis, all items in this construct were combined into one composite variable.

6.4.5 Management Accounting Practices

Table 6.7 summarizes 15 measures for changes in management accounting practices from year 2003 to 2007. The results from the descriptive statistics showed high mean scores for all of the items (>7.0). This result indicated that the sample companies had significantly changed its management accounting practices during the mentioned period. Product profitability analysis and budgetary control is the highly used MAP in Malaysian manufacturing companies.

The normality test for the items in this variable indicated that the data was not normally distributed. Factor analysis provided three factor loadings with a loading value of more than 0.5. These values, together with the AVE of 0.58 showed the valid measures for MAP. Cronbach's alpha of 0.92 indicated a reliable set of measures for MAP. Average mean score for all of the 15 items in this variable was calculated as a composite score for further analysis.

Table 6.7
Results of Descriptive Statistics and Reliability and Validity
(MAP)

Variables	Mean	SD	Factor Loadings		
			1	2	3
Cronbach's alpha = 0.92					
AVE = 0.58					
1. Standard costing	8.64	1.78	0.74		
2. Product life cycle analysis	7.82	1.65	0.72		
3. Value chain analysis	7.94	1.62	0.66		
4. Target Costing	8.19	1.63	0.67		
5. Benchmarking	8.52	1.52	0.58		
6. TQM	8.69	1.81	0.57		
7. Full/Absorption Costing	8.60	1.81		0.88	
8. Product profitability analysis	9.36	1.23		0.61	
9. Budgetary control	9.10	1.55		0.56	
10. Shareholder value analysis	8.38	1.73		0.56	
11. Customer profitability analysis	8.77	1.70		0.55	
12. CVP analysis	8.39	1.70		0.54	
13. Activity Based Costing (ABC)	7.59	2.01			0.85
14. Activity Based Management (ABM)	7.45	1.88			0.83
15. Variable/marginal costing	8.47	1.77			0.56
TOTAL	**8.30**				

(Likert scale of 1to11: 1-5 = negative change; 6 = no change; 7-11 = positive change)

6.4.6   Organizational Performance

As explained in Chapter Three, the score for organizational performance was calculated by multiplying the respective 'organizational performance' (11-point Likert scale) and 'importance' scores (5-point Likert scale). Therefore, the maximum final score is 55. Results in Table 6.8 show that, the mean score for all of the items in organizational performance was more than 30. This result indicated that the sample organizations had a positive change in its performance and they perceived their performance as an important aspect of the organization.

Table 6.8
Results of Descriptive Statistics and Reliability and Validity
(Performance)

Variables	Mean	SD	Factor Loadings		
			1	2	3
Cronbach's alpha =0.93					
AVE = 0.70					
1. Operating income	35.82	12.04	0.84		
2. Cash flow from operations	35.32	10.18	0.83		
3. Sales growth	37.85	11.03	0.82		
4. Market share	33.09	11.47	0.79		
5. Return on investment	30.97	10.80	0.74		
6. Personnel development	33.34	10.82		0.88	
7. Employee health and safety	36.31	11.08		0.86	
8. Workplace relations	33.75	11.21		0.82	
9. Cost reduction programs/ cost control	35.62	10.36		0.56	
10. Research and development (R&D)	30.36	12.46			0.89
11. New product development	32.45	11.00			0.87
12. Market development	33.50	10.29			0.59
TOTAL	**33.81**				

Since the final score of this variable was not derived directly from the observed measure, the Cronbach's alpha was not applicable. However, the Cronbach's alpha for the measurement of 'changes in organizational performance' was obtained in order to test the reliability of the measures for organizational performance. The value of 0.93 for Cronbach's alpha indicated reliable measures.

Analysis on EFA results in three factors loading for items in organizational performance with a value of more than 0.5. The high value of factors loading together with AVE of 0.70 signified the validity of the measures.

6.4.7 Implications for SEM

Tables 6.3 to 6.8 showed the results of factor loadings, AVE and Cronbach's alpha for all constructs. All indicators loaded well (>0.5) and values of reliability measures and AVE were all over the threshold value (Cronbach's alpha > 0.70, AVE > 0.50). High value of reliability measures indicated internal consistencies among the construct and provide confidence that the items in each variable were measuring a single construct (Baines & Langfield-Smith, 2003). High AVE and loadings on the predicted factors indicated convergent validity, whereas low correlation between factors (<0.80), demonstrated discriminant validity. Large correlations between constructs (greater than 0.80 or 0.90) suggested a lack of discriminant validity. Results from the correlation matrix showed correlations among the constructs of not more than 0.70, which signified discriminant validity of the measures. Therefore it can be concluded that all measures were statistically valid and reliable for further analysis. Hence, they were retained for structural model analysis.

Multicollinearity tests also show that none of the variables are highly correlated with each other, with VIF of less than 0.5 for all the variables (the threshold for VIF is < 0.4; lenient cut off is <0.5). The correlation matrix between two or more variables of less than 0.80 is also an indicator of low multicollinearity (see Table 6.9). It means that none of the variables are too highly correlated with each other. In order to proceed with the assessment of the structural model, composite scores for each construct were computed. These composite variables were used to develop the structural model in SEM analysis.

Results presented in this section show that the data in this study met all the assumptions except for normality. Even though the data do not meet the normality requirement, analysis using SEM can still proceed due to several reasons, as discussed in Chapter 4. Moreover, the measurement model (using confirmatory factor analysis) which requires normal data distribution was not tested in this study

because the composite scores from directly observed variables were used to test the models. However, since SEM offered alternative methods for the non-normal data distribution, analysis had been carried out using both methods for normal and non-normal data distributions. This is to gather evidence on whether multivariate normality has actually affected the choice of estimation techniques to be used in SEM. Therefore, the analysis had been carried out using both MLE and WLS techniques. Results from these analyses showed that there is no significant difference between the results in both methods. Detail of the analysis is explained in the next subsection.

Table 6.9
Correlation Matrix among the Constructs

Variables	Competition	AMT	Structure	Strategy	MAP	Performance
Competition	1.00					
AMT (VIF)	0.22* (0.48)	1.00				
Structure (VIF)	0.45* (0.47)	0.31* (0.48)	1.00			
Strategy (VIF)	0.55* (0.07)	0.26* (0.08)	0.68* (0.06)	1.00		
MAP (VIF)	0.39* (0.45)	0.25* (0.46)	0.59* (0.47)	0.70* (0.07)	1.00	
Performance (VIF)	0.30* (0.48)	0.20* (0.46)	0.53* (0.49)	0.56* (0.49)	0.52* (0.40)	1.00

*Correlation is significant at the $P < 0.01$ (one-tailed)

6.5   Correlations among the Hypothesized Variables

Before the data were analysed using SEM, the correlations among the hypothesized variables were studied in order to ensure that the relationships between them actually existed. Based on the correlation matrix in Table 6.9, the correlation matrix for each of the hypothesis is analysed. Table 6.10 summarizes the correlation coefficients among the hypothesized variables.

From the table, it can be seen that all the hypothesized variables were significantly correlated in the predicted direction ($p < 0.01$). However, these results did not provide enough evidence on how the changes in one variable could cause the changes in other variables. Therefore, the analysis using SEM was carried out in

order to obtain more evidence on the causal relationships among these variables, within the conceptual model of this study.

Table 6.10
Pearson Correlation Matrix among Hypothesized Variables

Hypotheses	Correlation Coefficient	Significant Level	Predicted Direction	Actual Direction
H1a: Competition→Structure	0.45	$p < 0.01$	Positive	Positive
H1b: AMT→Structure	0.31	$p < 0.01$	Positive	Positive
H2a: Competition→Strategy	0.55	$p < 0.01$	Positive	Positive
H2b: AMT→Strategy	0.26	$p < 0.01$	Positive	Positive
H3a: Competition→MAP	0.39	$p < 0.01$	Positive	Positive
H3b: AMT→MAP	0.25	$p < 0.01$	Positive	Positive
H4a: Structure→MAP	0.59	$p < 0.01$	Positive	Positive
H4b: MAP→Structure	0.59	$p < 0.01$	Positive	Positive
H5a: Strategy→MAP	0.71	$p < 0.01$	Positive	Positive
H5b: MAP→Strategy	0.71	$p < 0.01$	Positive	Positive
H6: MAP→Performance	0.52	$p < 0.01$	Positive	Positive
H7: Structure→Performance	0.53	$p < 0.01$	Positive	Positive
H8: Strategy→Performance	0.56	$p < 0.01$	Positive	Positive

6.6   Structural Equation Model Analysis and Hypotheses Testing

Researchers can choose one of the three alternative approaches offered by SEM procedure: strictly confirmatory approach; alternatives model approach; and model development approach. As this study combines confirmatory and exploratory purposes, a model development approach is used. Under this approach, if a model tested using SEM procedures is found to be deficient an alternative model is then tested based on changes suggested by SEM modification indexes. However, it should

be noted that SEM cannot itself resolve causal ambiguities, thus theoretical insight and judgement by the researcher is extremely important (Garson, 2009).

This section discusses stage five (specifying the structural model) and six (assessing the structural model validity) of SEM procedures. Stage one to three had been discussed in Chapter Three, stage four (assessing measurement model) is not applicable as there is only one measure (composite variables) used for each of the constructs. Scores for each variable were calculated by averaging the items in each construct following factor analysis.
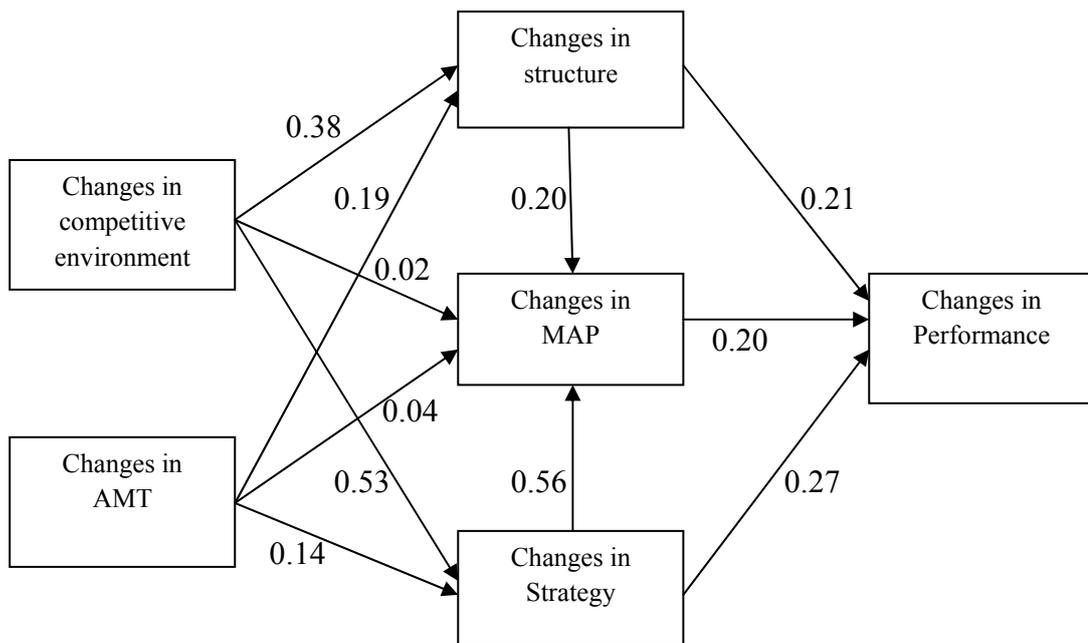
Table 6.11 lists the descriptive statistics for each variable in the study. The structural model was specified using path analysis. In path analysis, constructs are frequently modelled as composite variables derived from summing items in the construct domain. Once composite variables have been computed, it is possible to build structural equation models, provided that the internal consistency reliabilities are known. The reliability measures (Cronbach's alpha) ranged from 0.81 to 0.93, and exceed the minimum value of 0.70, which is usually considered acceptable (Nunnally, 1978). High reliability measures also provide confidence that the items in each variable were measuring a single construct (Baines & Langfield-Smith, 2003). Therefore, the models were tested using directly observed variables as shown by Holmes-Smith (2005). Data were analysed using LISREL for Windows Version 8.80.

Table 6.11
Descriptive Statistics for Final Variables

Variable	Theoretical range	Actual range	Mean	Standard deviation
Change in competitive environment	1-11	6.31-11.00	9.09	1.13
Change in AMT	1-11	1.52-9.96	7.66	1.25
Change in Strategy	1-11	5.88-11.00	9.07	1.14
Change in structure	1-11	6.00-10.90	8.50	1.06
Change in MAP	1-11	5.72-13.21	8.30	1.11
Performance	1-55	13.21-54.58	33.81	8.32

6.6.1 Hypothesized Model

The structural model was tested based on the hypotheses of the study (refer to Chapter Four; Figure 4.1 for hypothesized model). In this stage, relationships from one construct to another were assigned based on the proposed theoretical model using path analysis. As explained earlier, since the data of this study did not meet the multivariate normality requirement, analysis was carried out using both methods for non-normal and normal data distribution, to see if there was any difference in the result. First data were run using the MLE (for normal data), then using WLS estimation technique (for non-normal data), as suggested by Garson (2009). The outputs of both results are presented in Figure 6.2 and Figure 6.3 below.

Chi-Square = 53.83; df = 3; P-Value = 0.00; RMSEA = 0.285

Figure 6.2
Hypothesized Model (WLS)

Changes in
structure

Changes in
competitive
environment

0.40

0.23

0.03

0.05

0.20

Changes in
MAP

0.21

Changes in
Performance

Changes in
AMT

0.51

0.15

0.61

Changes in
Strategy

0.20

0.27
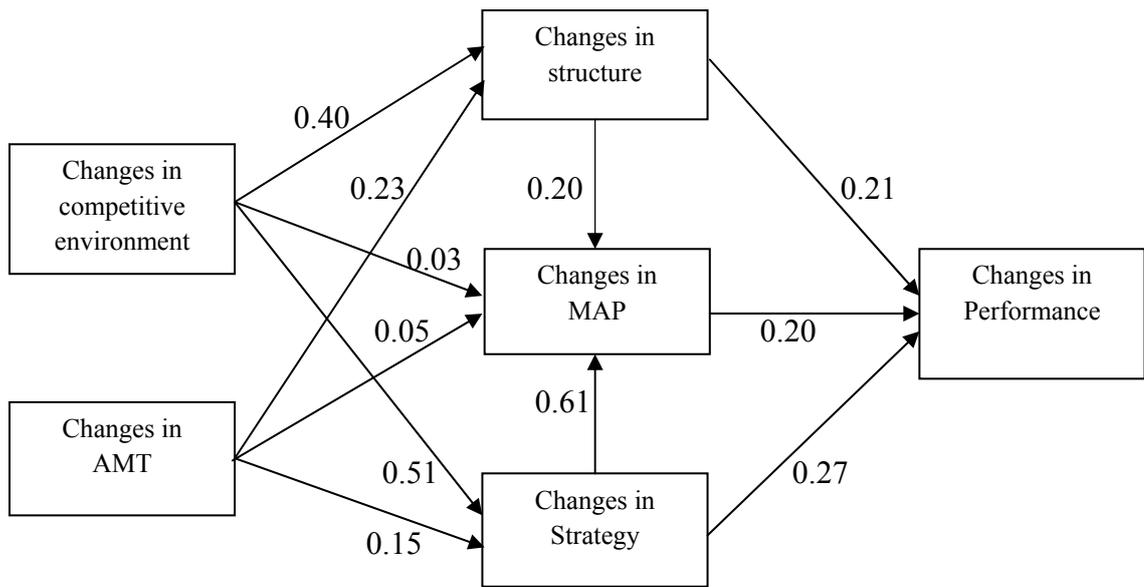
Chi-Square = 67.84; df = 3; P-Value = 0.00; RMSEA = 0.322

Figure 6.3
Hypothesized Model (MLE)

From the above results, it was found that there was no significant difference in structural estimates value for each parameter in either method. Very little difference is apparent for chi-square value (WLS=53.83; MLE=67.84) and RMSEA value (WLS=0.285; MLE=0.322). Despite these small differences, both methods showed that the structural models did not meet the criteria of a fit model. The chi-square values for both methods were too high with the *p*-value of less than 0.05 and RMSEA of more than 0.05. Since there was no difference in the results from both estimation techniques, the output from MLE was used in order to obtain a more accurate and reliable result. Following suggestions by Garson (2009), if the results from both methods are similar, the MLE output should be used because it provides more information. This is because MLE makes estimates based on maximizing the likelihood that the observed covariances are drawn from a population assumed to be the same as that reflected in the coefficients estimation estimates. This suggestion had been supported by Anderson and Young (1999). They had used more than one estimation technique and they indicated that their results were not affected by the estimation method used. Thus it provides evidence that the choice of the estimation

technique used in SEM does not appear to depend on the multivariate normality assumption. This result also supports most of the research in this area which had a non-normal data distribution, but still used the normal method to assess their model (for a review see, Henri, 2007, p. 90).

As explained above, the output for the hypothesized structural model showed a deviation from the fit model. Goodness of fit (GOF) statistics in Table 6.12 shows that, the p-value of 0.00 for χ^2 was far lower than the threshold level (which should be more than 0.05). The normed χ^2 (χ^2/df) was 22.6, which was much too high relative to the acceptable values from one (1) to two (2). RMSEA of more than 0.05 (=0.32) was also an indicator that the model was not a fit model. In order to generate a good fit model, LISREL provided a few suggestions to improve these indices. Based on the goodness of fit (GOF) statistics in Table 6.12, the modification indices suggested paths to be added in the model to increase the fit indices. The hypothesized model was then re-specified based on these suggestions.

Table 6.12
Goodness of Fit Statistics for Hypothesized Model (MLE)

Degrees of Freedom = 3
Minimum Fit Function Chi-Square = 81.66 (P = 0.0)
Normal Theory Weighted Least Squares Chi-Square = 67.84 (P = 0.0)
Estimated Non-centrality Parameter (NCP) = 64.84
90 Percent Confidence Interval for NCP = (41.66 ; 95.45)
Minimum Fit Function Value = 0.39
Population Discrepancy Function Value (F0) = 0.31
90 Percent Confidence Interval for F0 = (0.20 ; 0.46)
Root Mean Square Error of Approximation (RMSEA) = 0.32
90 Percent Confidence Interval for RMSEA = (0.26 ; 0.39)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.00
Expected Cross-Validation Index (ECVI) = 0.50
90 Percent Confidence Interval for ECVI = (0.39 ; 0.64)
ECVI for Saturated Model = 0.20
ECVI for Independence Model = 3.32
Chi-Square for Independence Model with 15 Degrees of Freedom = 681.62
Independence AIC = 693.62
Model AIC = 103.84
Saturated AIC = 42.00
Independence CAIC = 719.76
Model CAIC = 182.26
Saturated CAIC = 133.49
Normed Fit Index (NFI) = 0.90
Non-Normed Fit Index (NNFI) = 0.51
Parsimony Normed Fit Index (PNFI) = 0.18
Comparative Fit Index (CFI) = 0.90
Incremental Fit Index (IFI) = 0.90
Relative Fit Index (RFI) = 0.50
Critical N (CN) = 36.29
Root Mean Square Residual (RMR) = 1.31
Standardized RMR = 0.12
Goodness of Fit Index (GFI) = 0.90
Adjusted Goodness of Fit Index (AGFI) = 0.32
Parsimony Goodness of Fit Index (PGFI) = 0.13

The Modification Indices Suggest to Add the

Path to	from	Decrease in Chi-Square	New Estimate
STRUCTUR	STRATEGY	67.5	0.54
STRUCTUR	MAP	67.5	0.98
STRUCTUR	PERFORMA	32.6	0.09
STRATEGY	STRUCTUR	67.5	0.59
STRATEGY	MAP	67.5	2.96
STRATEGY	PERFORMA	19.9	0.08

The Modification Indices Suggest to Add an Error Covariance

Between	and	Decrease in Chi-Square	New Estimate
STRATEGY	STRUCTUR	67.5	0.50
STRATEGY	STRUCTUR	62.2	0.47
COMPETIT	STRUCTUR	49.5	-0.72
COMPETIT	STRATEGY	39.5	-0.81
COMPETIT	COMPETIT	67.5	2.50
AMT	STRUCTUR	23.4	-1.17
AMT	STRATEGY	33.1	-1.23
AMT	COMPETIT	67.5	3.21
AMT	AMT	67.5	18.28

6.6.2 Model Re-Specification

SEM output in Table 6.12 suggests the addition of paths from strategy to structure, structure to strategy, MAP to structure and MAP to strategy (which reduced χ^2 by 67.5 respectively), performance to strategy (which reduced χ^2 by 19.9), or performance to structure (which reduced χ^2 by 32.6). Before any decision on which path should be added to the model, it should be noted that, SEM requires that any decision to add any new parameter to the model must be supported by the theory. Thus, paths from MAP to structure as well as MAP to strategy are more admissible as they are part of the hypotheses in this study (H_{4b} and H_{5b}) and had already been identified as having sufficient underpinning theory. However LISREL did not permit both paths to be added to the model because of the lower degree of freedom ($df = 3$)[13]. Due to this constraint, only one path, i.e., path from MAP to structure was added to the model[14]. The new model is presented in Figure 6.4 below:
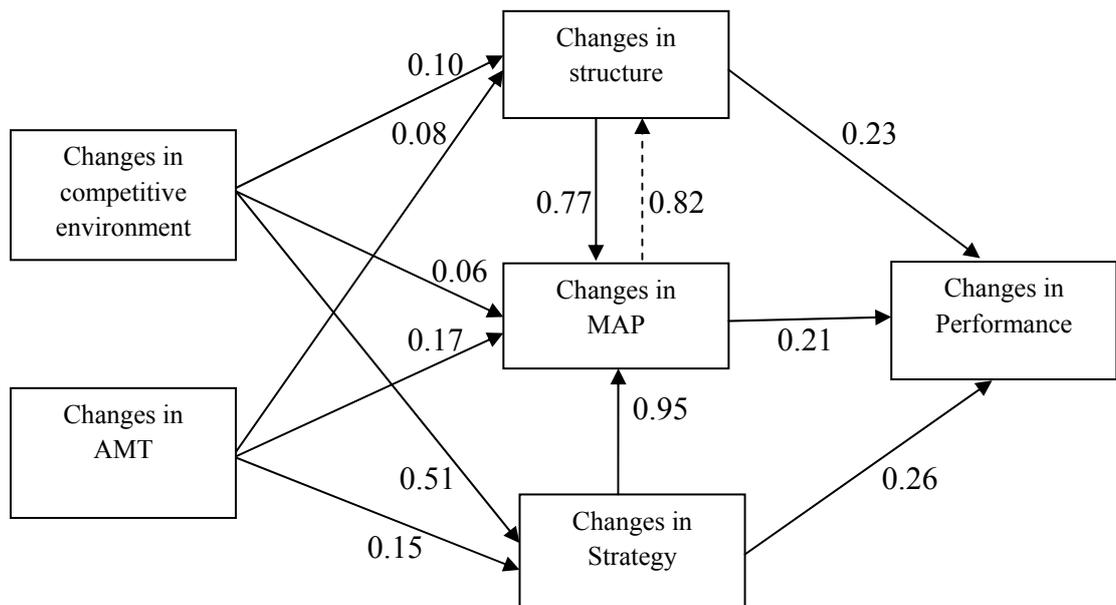
Chi-Square = 0.34; df = 2; P-Value = 0.843; RMSEA = 0.000

Figure 6.4
**Modified Model (Overfit)**

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[13] This is also the reason for not including H_{4b} and H_{5b} in the hypothesized model in the first place.

[14] There is no specific criterion for deciding which path should be added, as both paths have the same effect on the model (reduced χ^2 by 67.5 respectively). Therefore the decision was based on trial and error, to see which one provides the best model.

From Figure 6.4, it can be seen that the new model was a fit model. However, the normed χ^2 (χ^2/df) was less than 1 (=0.17), which indicated that the model is overfitted. Table 6.13 also shows that one of the GOF indices, i.e. NNFI has a value of more than 1.00 (= 1.02), with other fit indices equal to one (1.00). This is also an indication of an overfitted model, which also shows that the model is less parsimonious. In order to rectify this problem, the model was modified once again. This time all insignificant paths (i.e., Environment → Structure, Environment → MAP, and AMT→Structure) were removed from the model in order to increase the value of *df*, so that a new path from MAP to strategy (H_{5b}) could be added to the new model. This re-modification resulted in a more appropriate model fit (see Figure 6.5).

Table 6.13
Goodness of Fit Statistics for Modified Model

Degrees of Freedom = 2
Minimum Fit Function Chi-Square = 0.34 (P = 0.84)
Normal Theory Weighted Least Squares Chi-Square = 0.34 (P = 0.84)
Estimated Non-centrality Parameter (NCP) = 0.0
90 Percent Confidence Interval for NCP = (0.0 ; 2.49)
Minimum Fit Function Value = 0.0016
Population Discrepancy Function Value (F0) = 0.0
90 Percent Confidence Interval for F0 = (0.0 ; 0.012)
Root Mean Square Error of Approximation (RMSEA) = 0.0
90 Percent Confidence Interval for RMSEA = (0.0 ; 0.077)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.90
Expected Cross-Validation Index (ECVI) = 0.19
90 Percent Confidence Interval for ECVI = (0.19 ; 0.20)
ECVI for Saturated Model = 0.20
ECVI for Independence Model = 3.32
Chi-Square for Independence Model with 15 Degrees of Freedom = 681.62
Independence AIC = 693.62
Model AIC = 38.34
Saturated AIC = 42.00
Independence CAIC = 719.76
Model CAIC = 121.12
Saturated CAIC = 133.49
Normed Fit Index (NFI) = 1.00
Non-Normed Fit Index (NNFI) = 1.02
Parsimony Normed Fit Index (PNFI) = 0.13
Comparative Fit Index (CFI) = 1.00
Incremental Fit Index (IFI) = 1.00
Relative Fit Index (RFI) = 1.00
Critical N (CN) = 5690.78
Root Mean Square Residual (RMR) = 0.056
Standardized RMR = 0.0058
Goodness of Fit Index (GFI) = 1.00
Adjusted Goodness of Fit Index (AGFI) = 0.99
Parsimony Goodness of Fit Index (PGFI) = 0.095
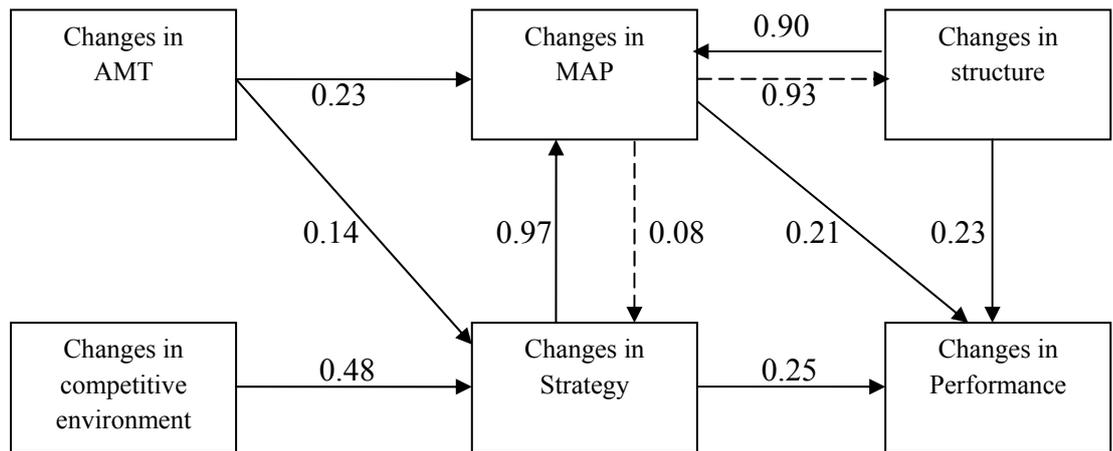
Chi-Square = 4.15; df = 4; P-Value = 0.39; RMSEA = 0.014

Figure 6.5
Re-Modified Model (Good Fit)

In order to examine GOF for the structural model, three important GOF indices were highlighted. They were the absolute fit indices (χ^2, normed χ^2, GFI, AGFI, RMR and RMSEA), incremental fit indices (CFI, NFI, NNFI), and indices of model parsimony[15]. Figure 6.5 above shows the good fit model. The *P*-value of the χ^2 was more than the threshold value of 0.05 ($p = 0.39$) and a normed χ^2 falls within the accepted range of 1 to 2 ($\chi^2/df = 1.04$). Thus, it is concluded that there was less than 5% likelihood that there is a difference between SEM estimated covariance matrix and observed sample covariance matrix. With such a small discrepancy between estimated and observed covariance matrix, it can be said that the specified model is a feasible representation of the data it purports to portray, which means the data were not significantly different from those expected on a given theory.

Table 6.14 shows that all of the important fit indices were above the threshold value. RMSEA and RMR values were less than the threshold value of 0.08. These showed that the discrepancy per degree of freedom (*df*) was small (RMSEA=0.014) and also a smaller difference between estimated and observed covariance matrix per element (RMR=0.037). The value of GFI of 0.99 and AGFI of 0.97 provide more evidence

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[15] Refer to threshold value in Chapter 3, Table 3.3, and column 1 (m ≤ 12).

for a well fitting model. AGFI is very similar to GFI except that an adjustment has been made to take into account the degree of freedom for the model.

Table 6.14
Goodness of Fit Statistics for Re-Modified Model

Degrees of Freedom = 4
Minimum Fit Function Chi-Square = 4.18 (P = 0.38)
Normal Theory Weighted Least Squares Chi-Square = 4.15 (P = 0.39)
Estimated Non-centrality Parameter (NCP) = 0.15
90 Percent Confidence Interval for NCP = (0.0 ; 9.42)
Minimum Fit Function Value = 0.020
Population Discrepancy Function Value (F0) = 0.00074
90 Percent Confidence Interval for F0 = (0.0 ; 0.045)
Root Mean Square Error of Approximation (RMSEA) = 0.014
90 Percent Confidence Interval for RMSEA = (0.0 ; 0.11)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.62
Expected Cross-Validation Index (ECVI) = 0.18
90 Percent Confidence Interval for ECVI = (0.18 ; 0.23)
ECVI for Saturated Model = 0.20
ECVI for Independence Model = 3.32
Chi-Square for Independence Model with 15 Degrees of Freedom = 681.62
Independence AIC = 693.62
Model AIC = 38.15
Saturated AIC = 42.00
Independence CAIC = 719.76
Model CAIC = 112.22
Saturated CAIC = 133.49
Normed Fit Index (NFI) = 0.99
Non-Normed Fit Index (NNFI) = 1.00
Parsimony Normed Fit Index (PNFI) = 0.27
Comparative Fit Index (CFI) = 1.00
Incremental Fit Index (IFI) = 1.00
Relative Fit Index (RFI) = 0.98
Critical N (CN) = 675.31
Root Mean Square Residual (RMR) = 0.037
Standardized RMR = 0.018
Goodness of Fit Index (GFI) = 0.99
Adjusted Goodness of Fit Index (AGFI) = 0.97
Parsimony Goodness of Fit Index (PGFI) = 0.19

Incremental fit indices lie between zeros to one, with a value of one indicating that the specified model is a perfect fit. It measures how much better is the model that assumes at least some relationships, as compared to a model with no relationship. The value of NFI and GFI were 0.99, which is more than the accepted value of 0.97 for the fit model. The value of CFI equal to 1.00 indicated a perfect model fit.

In order to achieve model parsimony, all the insignificants paths had been taken out from the model. This is to ensure that the parameters added to the model could support the model. The values of AIC and CAIC for the modified model (see Table 6.13) were equal to 38.34 and 121.12 respectively. However, these values decreased in the final model (see Table 6.14) when all the insignificant paths were taken out. The new AIC value was 38.15 and CAIC value was 112.22. It can be seen that the decrease in CAIC value was more than the decrease in AIC value. This is because CAIC places a bigger penalty on lack of parsimony than AIC. Therefore, the final structural model is more parsimonious than the first modified structural model.

6.6.3 Assessment of Structural Model Validity

The final stage involved in SEM is to test the validity of the structural model and its corresponding hypothesized theoretical relationships ($H_1 - H_8$). Particular emphasis is placed on the estimated parameters for the structural relationships, because they provide direct empirical evidence relating to the hypothesized relationships depicted in the structural model (Hair et al., 2006). Holmes-Smith (2005) suggested the use of a model-based approach to assess validity. The process of establishing the structural model's validity is based on the GOF values.

The χ^2 value and other fit indices used in testing the overall fit of the structural model also establish the validity of the model. The results of these measures had been discussed in the previous subsections. Results showed that the structural model had achieved a good fit, thus it also provides evidence for the model validity. The other key criterion to achieve structural model validity is that the estimated parameter be statistically significant. Details of these results are discussed in the following subsection.

6.6.4 Hypotheses Testing

Good model fit alone is not sufficient to support a proposed structural theory. Therefore, the individual parameter estimates that represent each hypothesis were

examined. The theoretical model is considered valid to the extent that the parameter estimates are statistically significant and in the predicted direction (Hair et al., 2006).

The test of the hypothesized structural model includes estimating the path coefficients and t-values. In addition to *t*-values provided in SEM analysis, *P*-values for each of the parameters were also calculated using the "Free Statistics Calculators" website developed by Soper (2009), to test the significant level of the hypotheses. The fit measures in the final model indicate a good model fit with four parameters significant at *P*<0.01, five parameters significant at *P*<0.05, and only one not significant. The results of the test are presented in Table 6.15.

Table 6.15
Result of Hypotheses Testing

Hypotheses	Estimates Value	Standardized Value	T-Value	P-Value
H_{1a}: Competition→Structure	0.09	0.10	1.44	0.143
H_{1b}: AMT→Structure	0.07	0.08	1.24	0.170
H_{2a}: Competition→Strategy	0.50	0.48	7.04	0.001**
H_{2b}: AMT→Strategy	0.13	0.14	2.25	0.043*
H_{3a}: Competition→MAP	0.06	0.06	0.78	0.259
H_{3b}: AMT→MAP	0.20	0.23	2.47	0.034*
H_{4a}: Structure→MAP	1.04	0.90	3.88	0.009**
H_{4b}: MAP→Structure	0.98	0.93	8.09	0.001**
H_{5a}: Strategy→MAP	1.22	0.97	7.95	0.001**
H_{5b}: MAP→Strategy	0.09	0.08	0.64	0.467
H_6: MAP→Performance	1.54	0.21	2.61	0.030*
H_7: Structure→Performance	1.81	0.63	3.00	0.020*
H_8: Strategy→Performance	1.83	0.25	2.91	0.022*

Significant level at   ** *P* < 0.01;   **P* < 0.05 (one-tailed)
(Detail SEM output is presented in Appendix E)

From table 6.15 above, it can be seen that no significant relationships have been found between changes in competitive environment and changes in AMT with changes in organizational structure. Therefore, Hypotheses 1a and 1b are rejected. These results show that changes in competitive environment and AMT did not cause the changes in organizational structure. However, changes in AMT had indirectly affected the changes in structure, through changes in MAP.

The second group of Hypotheses (2a and 2b) proposing changes in competitive environment and changes in AMT result in changes in organizational strategy were both supported at significance levels of $P<0.01$ and $P<0.05$ respectively. A strong positive relationship between changes in competitive environment and strategy indicated that the organizations had changed their strategy in order to remain competitive. The rapid manufacturing technology development also caused the organizations to change their strategy.

While Hypothesis 3b, the relationship between changes in AMT with changes in MAP, is supported at $P<0.05$, no significant relationship was found between changes in competitive environment with changes in MAP. Therefore, Hypothesis 3a is rejected. Despite the fact that changes in AMT directly cause the changes in MAP, it can be seen that changes in competitive environment had indirectly affected the changes in MAP through strategy.

It was posited that there is an interrelationship among changes in MAP with changes in organizational structure and strategy. Hypotheses 4a, 4b and 5a are all strongly supported at significant level of $P<0.01$, however the relationship between changes in MAP and changes in strategy was not significant, resulting in the rejection of Hypothesis 5b. These results show evidence that there is interrelationship between changes in MAP and changes in organizational structure, but not between changes in MAP and strategy.

Hypotheses 6 to 8 examined the impact of changes in competitive environment and AMT with changes in organizational factors (MAP, structure, and strategy) on performance. All of these hypotheses were supported at $P<0.05$. The changes in organizational factors gave a positive impact on performance. Therefore it can be concluded that the organizations reacted to changes in competitive environment and

technological advancement in a positive direction, which in turn impacted the performance in positive direction.

A review of the structural model also reveals an interesting picture of the indirect relationships between the variables of interest. Rather than hypothesized changes in AMT having a direct effect on change in organization structure, the effect was indirect through MAP. Also, rather than changes in competitive environment having a direct effect on changes in MAP, the effect was indirect through strategy. These findings will be discussed in greater detail in the next chapter.

6.7 Subsidiary Hypotheses Testing

Since the relationship between the changes in environmental factors with MAP had been established, this study then examined the types of changes in MAP occurring in these organizations. The relationships between changes in the environment with the type of changes in MAP were hypothesized in subsidiary Hypotheses 9 to 12. These hypotheses were analysed using SPSS version 17.0 for Windows. Given that the measures for the variables of type of changes in MAP were categorical, a non-parametric technique was used. In order to examine the relationship among the hypothesized variables, a Spearman's rank order correlation test was performed. This is an alternative non-parametric technique to the parametric bivariate correlation (Pearson's r). The results of the analysis are presented in the Table 6.16 below.

Table 6.16 details the correlation coefficients between the type of management accounting change and changes in manufacturing business environment. The table indicates a large number of significant relationships between changes in manufacturing business environment with the different types of changes in management accounting techniques (MAT). A significant negative association between the variables in H_9 shows that companies had changed their MAT in a changing manufacturing business environment ($r = -0.17$; $p = 0.013$). Hence, there is enough evidence to reject the null hypothesis (H_9).

Table 6.16
Spearman Correlation Coefficients

Types of Changes in MA Techniques	Change in Business Environment (Composite Score)		Change in Competition		Change in AMT	
	r	*p*-value	*r*	*p*-value	*r*	*p*-value
No Changes in MAT (H_9)	-0.170	0.013**	-0.047	0.495	-0.229	0.001***
Introduction of new MAT in parallel with the existing MAT (H_{10})	0.115	0.094*	0.046	0.504	0.120	0.082*
Replacement of existing MAT with a new MAT (H_{11})	0.217	0.001***	0.038	0.586	0.290	0.000***
Modification of the use of existing MAT (H_{12})	0.108	0.117	0.057	0.411	0.094	0.174

Significant level at   *$p<0.1$;   **$p<0.05$;   ***$p<0.01$

Table 6.16 shows that in the changing business environment, companies had introduced new MAT, in addition to their existing technique ($r = 0.115$; $p = 0.094$). Therefore H_{10} cannot be rejected. However, only change in AMT is significantly associated with introduction of new MAT ($r = 0.12$), but not with changes in competition ($r = 0.046$). These results indicate that competition did not significantly associate with changes in the use of management accounting techniques in manufacturing companies.

A strong significant association between the changes in manufacturing business environment and the replacement of existing MAT with the new technique is found ($r = 0.217$; $p = 0.001$). Therefore H_{11} is accepted. However, the results once again show that the companies only replaced their existing MAT when there is a change in AMT ($r = 0.29$). The results show that there is no significant association between competition and replacement of the MAT. Results in Table 6.16 also show that there is no significant association between the changes in manufacturing business environment and the modification of the use of MAT in manufacturing companies ($r = 0.108, p = 0.117$). Thus, H_{12} cannot be accepted.

Results of subsidiary hypotheses testing indicate that the changes in MAT used in sample companies are associated with the changes in manufacturing business environment. Nevertheless, only changes in AMT had a significant association with

the changes in MAT used in manufacturing companies, but not the changes in competition[16]. These results support the results of the main hypotheses, where the changes in AMT caused the changes in MAP (H_{3b}), but the changes in competitive business environment did not directly cause the changes in MAP (H_{3a}).

6.8   Summary

In this chapter, descriptive statistics for respondents' profile and variables of interest were reported. The structural equation modelling technique was used to test the hypotheses developed in the study, as well as to identify the model fitness among the variables. The factor analysis was conducted prior to the SEM analysis. Reliability and validity of the measurement were identified based on the cut-off values of factor loadings, AVE and Cronbachs' alpha. Following this, the hypothesized model was tested by the structural model using the SEM procedure. Besides the analysis on the hypothesized model, this study also posited four subsidiary hypotheses to support the findings from the hypothesized model. These hypotheses were tested using a non-parametric technique through Spearman correlation coefficients.

The majority of the main hypotheses (9 out of 13) were fully supported. Some of these hypotheses (two) were not directly supported, but instead showed indirect relationships; whereas the other two hypotheses were not supported. These results revealed that a positive alignment exists among the external environmental factors, organizational factors and that MAP had positively impacted organizational performance.

As for the subsidiary hypotheses, two of them were supported, while the other two were rejected. It was found that, with a change in environment, organizations introduced new MAT in addition to the existing techniques, and also replaced existing MAT with a new one. Results in subsidiary hypotheses support the result from the hypothesized model, where the organizations will change their MAP when there is a change in environment. However, the results from both hypothesized model and subsidiary hypotheses revealed that only changes in AMT significantly affected this change.

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[16] Detailed discussion of these relationships is presented in the next chapter (Chapter 7).

This chapter demonstrates that a majority of the hypotheses were supported (or partially supported), which indicates that the research framework proposed in this study was generally confirmed. The implications of these results are discussed in the next chapter.

CHAPTER SEVEN
DISCUSSION AND CONCLUSIONS

7.1   Introduction

The previous chapter has examined the outcome of the data and hypotheses testing. This chapter provides a more detail examination of the finding of this study and to provide further insight into the relationships between variables that have been studied. The next section discusses the findings from hypotheses testing and is followed by the conclusions in Section 3. Section 4 presents some contributions to the theoretical knowledge, methodological aspects and also contribution to practice. Section 5 provides some limitations faced by this study and Section 6 suggests some further research that could be extended from this study. A summary of the chapter is presented in the final section.

Table 7.1
Summary of Hypotheses Testing

	Hypotheses	**Support/Reject**
H_{1a}	*Organizations facing a more competitive environment will change to a flatter organizational structure.*	Rejected
H_{1b}	*Organizations facing changes in manufacturing technology advancement will change to a flatter organizational structure.*	Rejected
H_{2a}	*Organizations facing a more competitive environment will change towards a differentiation strategy.*	Supported
H_{2b}	*Organizations facing manufacturing technology advancement will change towards a differentiation strategy.*	Supported
H_{3a}	*Organizations facing a more competitive environment will change their management accounting practices.*	Rejected
H_{3b}	*Organizations adopting advanced manufacturing technology will change their management accounting practices.*	Supported
H_{4a}	*A change in organization structure will result in changes in management accounting practices.*	Supported
H_{4b}	*A change in management accounting practices will result in changes in organization structure.*	Supported
H_{5a}	*A change in organization strategy will result in changes in management accounting practices.*	Supported
H_{5b}	*A change in management accounting practices will result in changes in organization strategy.*	Rejected
H_6	*A change in management accounting practices will result in improved organizational performance.*	Supported
H_7	*A change in organization structures will result in improved organizational performance.*	Supported
H_8	*A change in organization strategy will result in improved organizational performance.*	Supported
H_9	*Organizations in a changing environment will not change their management accounting techniques.*	Rejected
H_{10}	*Organizations in a changing environment will introduce new management accounting techniques in parallel with their existing techniques.*	Supported
H_{11}	*Organizations in a changing environment will replace their existing management accounting techniques with new techniques.*	Supported
H_{12}	*Organizations in a changing environment will modify the use of their existing management accounting techniques.*	Supported

7.2   Discussion of Findings

The findings from this study confirm that there has been a significant increase in the competitive environment faced by Malaysian manufacturing industries over the past five years. The use of advanced manufacturing technology (AMT) has also increased significantly. Results also show a significant increase in differentiation strategy, the use of flat organization structure practices and management accounting practices (MAP). These outcomes are particularly important for companies wishing to compete in a globalized environment. The relationships among these variables have been analysed using SEM techniques. The results of the hypotheses testing (summarised in Table 7.1) are discussed in this chapter in conjunction with the literature reviewed.

7.2.1   Changes in Competition, AMT and Structure (H_1)

The first group of hypotheses tested the relationship between competitive environment and AMT with structure. It has been suggested that change in organizational structure is stimulated by rapid environmental change (Schwarz & Shulman, 2007). The contingency literature indicates that technology and competitive environment affect the design and functioning of the organization. Previous research also shows that firms which operated in a highly competitive environment increased organizational commitment towards decentralization (e.g., Subramaniam & Mia, 2001). However, the structural model indicates no significant relationship between changes in competitive environment and AMT with the changes in organizational structure in Malaysian manufacturing companies.

While many other studies suggest a relationship among competitive environment and AMT with structure (e.g., Choe, 2004; DeLisi, 1990; Harris, 1996), the results in this study are contradictory. However it supports the findings by Baines and Langfield-Smith (2003), who found no significant direct relationship between competitive environment with structure, and AMT with structure. In their study, competitive environment appears to respond to the change in strategy which later resulted in changes in structure; meanwhile this study shows an indirect relationship between AMT and structure through changes in MAP. This result suggests that,

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manufacturing companies in Malaysia will change their structure when there is a reaction between AMT and MAP. When the company adopts more advanced manufacturing technology, it changes the nature of the production process and prompts the need for better cost management and in some way it will change a routine and work unit element in an organization (Emmanuel et al., 1990; Haldma & Laats, 2002; Macy & Arunachalam, 1995). This change will be successful if it takes place where employee empowerment is exercised in an organization. Empowerment enables the employees to perform several tasks (Dibrell & Miller, 2002). Hence, a flatter organization structure is needed to complete this change process.

7.2.2 Changes in Competition, AMT and Strategy (H₂)

The second group of hypotheses proposed that a change in competitive environment and AMT will result in changes towards differentiation strategy. While the findings show that changes in competitive environment and AMT do not significantly relate to changes in structure, different findings are obtained for strategy. These hypotheses support many other studies in this area (for example, Baines & Langfield-Smith, 2003; Chenhall, 2003; DeLisi, 1990; Fuschs et al., 2000; Schroeder & Congden, 2000). It shows that strategy is an important variable in the study of organizations.

It has also been suggested that organizations facing a more competitive environment and increase use of AMT will change towards a differentiation strategy. Previous studies have also established that an appropriate matching among these variables can enhance performance (Baines & Langfield-Smith, 2003; Chenhall & Langfield-Smith, 2003; Davenport, 2000; Kotha & Swamidass, 2000; Schroeder & Congden, 2000). As Baines and Langfield-Smith (2003) demonstrate, a strong relationship among competitive environment and AMT with differentiation strategy in Australia manufacturing companies confirms that in a manufacturing environment, dominated by demanding customers and advanced technology, a proper link with strategy is important for the organizations to remain competitive. These findings imply that competitive environment and the application of effective manufacturing technology requires organizations to formulate a clear business strategy, in order to differentiate themselves from their competitors as well as to create value for their customers

(Jermias & Gani, 2002; Simons, 1987). Hence, it appears that a proper match among these variables is essential regardless of how they are operated in developed or less developed economic settings.

7.2.3   Changes in Competition, AMT and MAP (H₃)

Previous contingency-style management accounting research suggested that changes in MAP are expected to be high for firms operating with advanced technology and in a competitive environment. Much literature shows a positive significant relationship between competition and MAP (for example, Hoque et al., 2001; Libby & Waterhouse, 1996; Mia & Clarke, 1999). To remain competitive, organizations need to monitor a diverse range of competition factors using MAS that tracks both financial and non-financial performance. Haldma and Laats (2002) show that increasing competition affected the MAS. However, the corresponding result in this study shows that companies in Malaysian manufacturing industry have responded to the changes in competitive environment in different way. Results show that increases in competitive environment do not cause changes in MAP in Malaysian manufacturing companies.

This might be attributable to government policies, which often favour manufacturing companies in Malaysia. Several incentives, for example tax and financial incentives, have been introduced, especially to small and medium size companies. It is also argued that manufacturing industry in Malaysia has not been based on strong domestic producers but has instead relied on foreign multinationals producing for export. Globalization not only makes this country open to greater competition, but also acts as a medium to 'transfer' MAS through companies establishing operations in Malaysia. As foreign companies often use more advanced MAP, local companies are still largely using traditional methods (Abdul-Rahman et al., 2002). Hence, this situation means that managers do not need different types of management accounting information to support their decision needs. This argument is consistent with Ma and Tayles (2009). The new management accounting techniques would be adopted if it met the needs of senior management and it would not have taken place without their support.

Apart from the above result, it is found that the increased use of AMT by Malaysian manufacturing companies has influenced changes in their MAP. This result is supported by many other studies in this area (for example, Askarany & Smith, 2008; Choe, 2004; Hoque, 2000). Globalization brings in new technologies to Malaysia; with the introduction of new technologies, the structure of manufacturing costs will change; hence it requires MAP to be designed to support, not restrain the introduction of innovative processes and technologies (Abdel-Kader & Luther, 2008). The contemporary manufacturing technologies such as CAD, CAM and robotics have significant implications for MAP because traditional system cannot effectively help managers to manage resources as well as identifying relevant costs (Askarany & Smith, 2008; Hoque, 2000). Thus, changes in MAP are important to better align with adopted technology, and help facilitate manufacturing operations to be more successful (Baines & Langfield-Smith, 2003).

7.2.4   Changes in MAP and Structure (H$_4$)

Hypotheses 4a and 4b proposed an interrelationship between organizational structures and MAP. Much literature has supported this relationship (for example, Gerdin, 2005; Luther & Longden, 2001), but none of them had really tested them. The results in this study have filled this gap. The results show a significant interrelationship between MAP and structure. It is confirmed that change in the form of flatter organizational structures has caused changes in MAP, and increased change in MAP also causes structural change.

These results are also consistent with the formal and informal change dichotomies in OIE. Formal change occurs through the introduction of new MAP in organizations. For example MAP such as ABC has lead to new administrative procedures, policies and organizational structure (Gosselin, 1997). According to Chenhall and Langfield-Smith (1998a) advanced MAP such as ABC, ABM and TQM are not only restricted to production processes, but can also provide new approaches as part of restructuring process.

Haldma and Laats (2002) showed how organizational structure influenced MAP to change, while J. A. Smith et al. (2005) illustrated how changes in organization

affected by outsourcing, causes changes in MAP. Thus, MAP appears to be both an element of organizational structure and a consequence of the chosen structure (Luther & Longden, 2001). This finding could be the key to our understanding of the relationship between MAP and structure, which is not only direct, but also reciprocal.

7.2.5   Changes in MAP and Strategy (H$_5$)

While there was a significant interrelationship between MAP and structure, only a one-way relationship is found between MAP and strategy. Despite the suggestion that there could be a reciprocal relationship between MAP and strategy, previous study in this area had tested this relationship. Findings in this study show that increased changes in the differentiation strategy caused changes in MAP, but not the contrary. This finding is consistent with the traditional view that MAS is an outcome of strategy. In addition, Simons (1987) also suggested that MAP has to be modified in accordance with the business strategy. This view is supported by Baines and Langfield-Smith (2003) and Hyvönen (2007), who found significant relationships between strategy and MAP.

It is likely that differentiation strategy is not only an important factor in the design and use of MAS but also have direct impact on it. This conclusion is based on the work of Chenhall and Langfield-Smith (1998b), who showed that high performing product differentiator strategy firms are associated with MAP. Thus, this study rejects the suggestion that changes in MAP will also impact on strategy (Kloot, 1997; Kober et al., 2007; Perera et al., 2003).

7.2.6   Impact of Management Accounting and Organizational Change on Performance (H$_6$-H$_8$)

As depicted in Figure 7.1, the findings in this study show the evidence that an alignment among changes in external environment with changes in MAP, structure and strategy have caused an increase in performance of Malaysian manufacturing companies. Despite the direct relationship between MAP, structure and strategy with

performance, structural equation modelling demonstrates that interaction among AMT, MAP and structure has improved organizational performance. This improvement also resulted from the interaction among competitive environment, strategy and MAP, and among strategy, MAP and structure. These results are consistent with the suggestion that high organizational performance is dependent on a good match among the organizational systems (Baines & Langfield-Smith, 2003; Haldma & Laats, 2002; Hoque, 2004; Langfield-Smith, 1997). Chenhall and Langfield-Smith (1998b) found a greater use of advanced MAP in a firm that placed a strong emphasis on differentiation strategies resulting in high performance.

There is well-established empirical evidence for an association between MAP and performance. Baines and Langfield-Smith (2003) found that firms with a greater reliance on non-financial accounting information improved their performance. Ittner and Larcker (1995), Mia and Clarke (1999), and Sim and Killough (1998) found a positive interaction between management accounting information and performance. These findings support the suggestion that changes in MAS are associated with good financial performance (Laitinen, 2006).

Very limited evidence exists to show that changes in structure and strategy would be directly associated with organizational performance. It is also suggested that clear strategic priorities alone are not sufficient to ensure high organizational performance; they must be supported by other organizational systems. Achieving appropriate links between them is important to performance improvement (Jermias & Gani, 2002). Some studies show that a combination among the organizational factors will increase performance. For example Baines and Langfield-Smith (2003) showed that greater use of team-based structures, driven by changes in strategy, and greater reliance on non-financial management accounting information, had resulted in improved organizational performance. Penning (1976; as cited in Dalton et al., 1980) showed structural change to have little effect on performance, while Pratt (2004) found that organizations involving employees as part of the company's mission and strategy will increase performance. Thus results in this study, which are supported by previous findings, have proved that an alignment among competitive environment, AMT, MAP, structure and strategy have a positive impact on organizational performance.
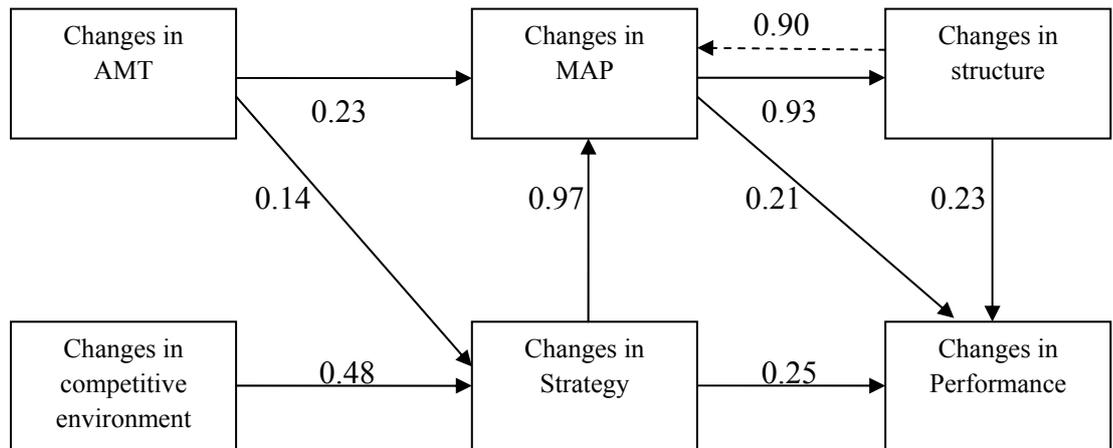
Figure 7.1
Final Model

7.2.7 Technical Level Changes in MAP (H$_9$-H$_{12}$)

This study has demonstrated that there is a significant increase in the use of MAP in the manufacturing companies in Malaysia. Among the various types of technical changes occurred in MAP in Malaysian manufacturing companies, introduction of new management accounting techniques (MAT) in parallel with the existing techniques, and replacement of existing techniques with a new one, have frequently taken place. Even though Sulaiman and Mitchell (2005) also found modification of existing techniques to be an important type of changes, this was not found to be the case.

In order to manage the alignment of different modes of change especially an increased change in AMT, which significantly impacts the changes in MAP, changes to a more effective MAT are a vital decision. As technology becomes more advanced, current MAT needs to be replaced with new techniques that can cope with the change in production process as well as cost structure. As many of the local companies still rely on traditional techniques, adoption of new technology requires companies to introduce new techniques to deal with the new changes. This conclusion is supported by Grandlund (2001), Burns et al. (1999) and Sulaiman and

Mitchell (2005). This means that advanced and traditional MATs can potentially be perceived as both complements and substitutes for each other.

7.3   Conclusions and Implications

The overall picture emerging from this study is based on the theoretical framework developed from Western studies, and applied to Malaysian manufacturing environment. Malaysia is categorised as a developing country, however its manufacturing industry is identified as more concentrated than most other developed countries. Focusing on the alignment among competitive environment, AMT, MAP, structure and strategy, this study addressed empirically the research question proposed in the first chapter by testing for causal relationships between these measures and their impacts on organizational performance. The conclusions reached from the results of this study have profound implications for both theory and practice.

Based on the findings from a pilot study as well as the main study, it is concluded that the Western research model adopted is generally applicable to Malaysian manufacturing industry. The results show a significant increase of changes in all measures. Globalization has opened manufacturing industry in Malaysia to greater competition, and application of advanced manufacturing technology in Malaysia has also increased. Companies have also placed more emphasis on differentiation strategy and significantly used a flatter organizational structure. An increased use of MAP is also evident. It has been found that both traditional and advanced management accounting techniques appeared to be almost equally important. These findings show that manufacturing companies in Malaysia rely on both techniques in order to cope with significant changes in their internal as well as external environmental factors. The increase in organizational performance is also witnessed in this study. Therefore, it is concluded that the level of changes in competitive environment, AMT, structure, strategy, MAP and performance are significantly increased in Malaysian manufacturing companies.

This study has supported numerous conclusions from the existing literature regarding increases in competitive environment and AMT causing changes in internal

organizational factors. However, for reasons discussed in subsection 7.1.1, changes in competitive environment and AMT do not impact on organizational structure. Organizations operating in a competitive environment will invest in manufacturing technology that could help them to reorganize the production process and increase the level of quality product. In order to achieve maximum effectiveness, organizational elements like strategy and MAP have to change simultaneously. As the firms persistently search for new market opportunities, they have to compete through new products and market development which subsequently impact the organizations' learning strategy. Customer oriented aspects such as quality, flexibility, innovative products and dependability of supply could be achieved through a greater emphasis on effective differentiation strategy. The implementation of AMT, MAS should be designed to support the introduction of innovative processes and technologies. Thus, a better alignment among competition, AMT, strategy and MAP will facilitate business operations to be more successful and help the managers to manage resources more effectively.

The results also indicate that proper alignment between changes in external and internal organizational factors are important in facilitating an effective business operation. Positive interactions among the internal factors are vital in order to sustain and/or improve organizational performance. The results in this study show that changes in organizational structure and strategy caused a change in MAP. However, the relationship between changes in structure and changes in MAP is not only in one direction but also reciprocal. The structural model also shows a significant link among strategy, MAP and structure, which leads to an increase in performance.

The main role of MAS is to provide useful information in helping managers make effective decisions. Failure to provide appropriate information may contribute to ineffective resource management and decline in performance. While external environment factors drive firms to place more emphasis on differentiation strategy to maintain effectiveness, changes in MAP are required to act as a platform for managing this change. Therefore, the design of MAS should depend on the context of the organizational setting. MAS that is tailored to support business strategy will lead to competitive advantage and superior performance. This is because, the use of effective MAP can assist employees to focus more easily on achieving differentiation

priorities, which could help in maintaining and improving customer expectations especially in terms of quality and functionality. To make it work, employees should be given an opportunity to make the best decision in the light of current changing conditions. This could only be achieved by firms that exercise a decentralized structure because under this type of structure, power to make decisions is given to the person who has the knowledge. Empowerment places both authority and responsibility to make decisions at low levels in an organization. Changing to a flatter structure with a team-based focus and employee empowerment will result in an increase access to relevant information, which is a key in such decision making. Therefore, in decentralized structures, MAP acts as a chain to connect strategies with various activities across organizations. A significant link among them has been demonstrated in this study, with a positive impact on performance.

Another unsettled issue in the management accounting literature is the scope of changes in MAS. It has been questioned whether advanced MAP should be used to complement or substitute for traditional practices. This issue is important as firms have to make suitable changes in their MAP to maintain effectiveness. Results in subsidiary hypotheses testing show two different types of changes of MAP in manufacturing companies in Malaysia. The changes include both introduction of new management accounting techniques, in addition to existing techniques; and replacement of the existing techniques with new ones. These results provide evidence that advanced and traditional MAS should be used both to complement and substitute for each other. Where the traditional system is inadequate in providing sufficient information, but still able to provide useful information, an advanced system should be adopted in order to assist in providing more information for decision making purposes. However, once the traditional systems are no longer able to cope with the changes in information requirements, and fail to provide useful information, then it should be replaced with the more advanced system.

7.4   Contributions to Knowledge

The contributions of this study to the existing body of knowledge in this area are divided into theoretical, methodological and practical contributions. Each of these contributions is discussed below.

7.4.1   Theoretical contributions

This study has added new knowledge to the management accounting and organizational change literature in developing economic settings, especially in Malaysian manufacturing industry. Although there are other studies have been conducted in other developing countries such as Africa (Waweru et al., 2004), they do not specifically test the alignment among the variables using a structural model. Moreover, different economic and cultural characteristics between Malaysia and other developing countries mean the findings of this study provide a better understanding of how management accounting and organizational change take place in a different developing economic setting.

This study has also filled a gap in the literature concerning the relationships between MAP, structure and strategy. While many studies have suggested there could be interrelationships between these variables, it has actually tested in this study. It has been shown that there is an interrelationship between MAP and structure, but with only a one-way relationship with strategy. In addition, this study has also contributed to the arguments as to whether the advanced and traditional MAS should act as a complement or substitute to each other (or both). This study has filled this gap by confirming that traditional and advanced management accounting system are both a substitute and complement to each other.

Apart from the contribution to the existing management accounting change literature, this study also contributes to the existing OIE and contingency theories. While the theories advocate that changes in internal organizational factors are contingent upon the changes in external environment factors, the alignment among them is also essential in determining organizational success. This study has also identified how the process of change can be institutionalised through the interaction among the

internal factors. This study demonstrates how organization change is institutionalised through the formal and informal change process.

7.4.2 Methodological contributions

This study has adapted and modified an instrument by Baines and Langfield-Smith (2003). However, it is noted that the study by Baines and Langfield-Smith (2003) and many other studies in this area examined the changes over a three year period only. This study examined the changes over a five year period because this provides a more detailed opportunity to capture the time lag between various organizational changes. In addition, this study combined both traditional and advanced management techniques as indicators of the MAP construct. This method has enabled the researcher to further analyse how both techniques act as instruments of management accounting change in organizations, and it has been shown that each acts as a substitute and complement for the other.

Data in this study had been analysed using SEM. Argument persists over the data multivariate normality in SEM in many studies. According to Henri (2007) and Shook et al. (2004), most researchers using SEM to analyse their survey data, do not discuss the normality issue; a few studies report that their data met the normality requirement, whereas most demonstrate a violation of multivariate normality. Most of these reviewed studies have used the MLE technique to analyse their structural model, while some of them did not disclose the technique used. Since the data in this study did not meet the normality assumption, analysis has been conducted using both techniques that require data normality (MLE) and one that does not require multivariate normality of the data (WLS). This step is carried out to ensure that non-normal data would not significantly affect the reliability of the final result. The results show no significant difference between the outcomes from these two techniques, thus MLE has been chosen over WLS as its selects the estimates which have the greatest chance of reproducing the observed data. Results of the analysis showed that MLE has produced a reliable result, by not only showing a well-fitted model but also one which is strongly supported by the theory. Therefore, it contributes to our understanding of the seriousness of data normality as a major

concern in SEM. It has also shown that the MLE technique is fairly robust to non-normal data.

7.4.3 Practical contributions

The business environment has changed and will continuously changing. Thus, it is critical to ensure that appropriate MAS is practiced in organizations. This is important because an effective MAS can help to better coordinate business activities as well as to provide useful information for managers to make decisions. This process will ultimately improve organizational performance. If the MAP does not properly match with the existing organization's structure and strategy, the managers might have been provided with inaccurate information, which consequently might jeopardize the firm's performance.

Thus, a proper alignment among organization structure, strategy and MAS is necessary. If this alignment matches with the changes in environment, superior performance can be achieved by the organization. Therefore, results in this study provide helpful insights and useful guidelines to organizations facing these changes, especially those managers who are responsible in making sure that their companies move toward in an appropriate direction.

7.5   Limitations

As with any research, the current study is subject to a number of limitations. Although this study has significantly contributed to our understanding of how the alignment among the studied variables improved performance; there are also some limitations that need to be highlighted. First, the sample may not be fully representative of the population of manufacturing industry in Malaysia. Due to the relatively small sample size, any generalization of the study's results to non-manufacturing organizations or beyond cannot be made without considerable caution. The relatively low response rate is consistently a major limitation in accounting research.

In addition, each of the variables examined in this study comprises several indicators which were reduced to constructs, which limit the extent to which the constructs represent the variables measured. Third, the strategy variable tested in this study only concentrated on differentiation strategy, which restricted the analysis to provide more information on the strategic behaviour in the studied organizations. Finally, data was collected at one point in time rather than longitudinally. Thus, the research could not account for time-lag effects of changes in external and internal organizational factors on performance, as the changes in these factors may not influence firm performance directly after the changes took place.

The limitations addressed above however, do not negate the results and findings in this study. Despite the limitations addressed above, the results in this study have extended our understanding of management accounting and organizational change in Malaysian manufacturing companies. The limitations above are outlined to acknowledge their existence and to stress the need for further research.

7.6 Future Research

There are several significant issues to be considered for future research. This study provides a detailed examination on how the external and internal organizational factors have caused MAS to change. However, the types of MAS that should be adopted and the circumstances in which change should take place are beyond the scope of this study. Further examination of this area should be conducted in order to provide more guidelines to practitioners as well as to produce better theories.

Another area that could be researched relates to the relationship between strategy and structure. This study has identified strategy as the most important variable in management accounting and organizational research. It has significantly responded to the change in external environment and has also significantly influenced change in MAP. An interaction between strategies and other variables has resulted in performance improvement. However, this study did not test its relationship with structure. Therefore, further research might be carried out to test how strategy and structure are related to each other and if their interaction could also lead to a performance improvement.

Moreover, this study only applied one of the existing strategy typologies (i.e. differentiation strategy). Further research should be carried out by applying a multi-dimensional construct covering activities in various functional areas including the competitive position adopted, for measuring strategic behaviour. This approach will enhance the quality of information derived from the analysis and will enable the strategy to be examined from different angles whilst providing a convergent perspective to strategic orientation.

Findings from this quantitative study do not capture an in-depth understanding of the subject phenomena, thus a qualitative approach such as case study might be conducted to shed further light on this issue. A case study among certain manufacturing companies might reveal the actual change process for detailed investigation. Moreover, any obstacles or problems associated with failures in the change process can be easily identified and tested, providing greater understanding of the subject phenomena.

7.7   Summary

This study has attempted to enhance our understanding of the effect of alignment among management accounting and organizational change, in Malaysian manufacturing companies, on performance. It explores the causal relationship between competitive environment and advanced manufacturing technology; with MAP, strategy and structure. Interrelationship between MAP with structure and strategy is also investigated. The research findings confirm that the model developed mainly from a Western perspective is largely applicable to the Malaysian context. Moreover, this study presents a number of distinctive findings to add to the existing literature. It identifies certain important associations, particularly in relation to the alignment among the organizational factors, i.e., MAP, structure and strategy. As the business environment is continuously changing, organizations and their managers will find it is critical to cope with these changes to ensure that institutional factors are properly matched. Supply of relevant information is essential for managers to make effective decisions regarding an appropriate alignment.

This study had been designed to achieve the research objectives. By employing a valid and reliable methodology, this study has significantly contributed to the theoretical and methodological knowledge in this area. The findings from this research also provide a useful guideline to organizations, especially their managers, to make decisions in light of the current changing environment. Apart from these contributions, this research's outcome has also provided useful guidance for future research.

REFERENCES

Abdel-Kader, M., & Luther, R. (2008). The impact of firm characteristics on management accounting practices: A UK-based empirical analysis. *The British Accounting Review, 40*(1), 2-27.

Abdul-Aziz, Z., Chan, J. F. L., & Metcalfe, A. V. (2000). Quality practices in the manufacturing industry in the UK and Malaysia. *Total Quality Management, 11*(8), 1053-1064.

Abdul-Rahman, I. K. (1993). *Privatisation in Malaysia with special reference to changes in accounting system.* Unpublished PhD, University of Hull.

Abdul-Rahman, I. K., Omar, N., & Taylor, D. W. (2002). The migration of a government trading enterprise's accounting system during privatization with reference to Japanese management accounting. *Asian Review of Accounting 10*(1), 22-48.

Abernethy, M. A., & Brownell, P. (1999). The role of budgets in organizations facing strategic change: An exploratory study. *Accounting, Organizations and Society, 24*(3), 189-204.

Albright, T. L., & Lee, T. A. (1995). Case study of the organizational effects of accounting information within a manufacturing environment (110 A). *Advances in Management Accounting, 4*, 27-43.

Allen, I. E., & Seaman, C. A. (2007). Likert scales and data analyses. *Quality Progress, 40*(7), 64-65.

Anderson, S. W., & Young, S. M. (1999). The impact of contextual and process factors on the evaluation of activity-based costing systems. *Accounting, Organizations and Society, 24*, 525-559.

Anderson, S. W., & Young, S. M. (2001). *Implementing management innovations.* Massachusetts: Kluwer Academic Publishers

Andon, P., Baxter, J., & Chua, W. F. (2007). Accounting change as relational drifting: A field study of experiments with performance measurement. *Management Accounting Research, 18*(2), 273-308.

Askarany, D., & Smith, M. (2008). Diffusion of innovation and business size: A longitudinal study of PACIA. *Managerial Auditing Journal, 23*(9), 900-916.

Baines, A., & Langfield-Smith, K. (2003). Antecedents to management accounting change: a structural equation approach. *Accounting, Organizations and Society, 28*(7,8), 675-698.

Barnett, W. P., & Caroll, G. R. (1995). Modeling internal organizational change. *Annual Review of Sociology, 21*, 217-236.

Bhattacharya, M. (2002). Industrial concentration and competition in Malaysian manufacturing. *Applied Economics, 34*(17), 2127-2141.

Brownell, P. (1995). *Research methods in management accounting.* Melbourne: Coopers and Lybrand.

Bryman, A. (2001). *Social research methods.* Oxford: Oxford University Press.

Burns, J., Ezzamel, M., & Scapens, R. W. (1999). Management accounting change in the UK. *Management Accounting, 77,* 28-30.

Burns, J., & Scapens, R. W. (2000). Conceptualizing management accounting change: An institutional framework. *Management Accounting Research, 11*(1), 3-25.

Burns, J., & Vaivio, J. (2001). Management accounting change. *Management Accounting Research, 12*(4), 389-402.

Cadez, S., & Guilding, C. (2008a). An exploratory investigation of an integrated contingency model of strategic management accounting. *Accounting, Organizations and Society, 33*(7-8), 836-863.

Cadez, S., & Guilding, C. (2008b). *Strategy and strategic management accounting : An investigation of organizational configurations.* Paper presented at the Manchester Business School Research Seminar.

Chenhall, R. H. (1997). Reliance on manufacturing performance measures, total quality management and organizational performance. *Management Accounting Research, 8*(2), 187-206.

Chenhall, R. H. (2003). Management control systems design within its organizational context: Findings from contingency-based research and directions for the future. *Accounting, Organizations and Society, 28*(2,3), 127-168.

Chenhall, R. H. (2007). Theorizing contingencies in management control systems research. *Handbook of Management Accounting Research, 1*, 163-205.

Chenhall, R. H. (2008). Accounting for the horizontal organization: A review essay. *Accounting, Organizations and Society, 33*(4-5), 517-550.

Chenhall, R. H., & Euske, K. J. (2007). The role of management control systems in planned organizational change: An analysis of two organizations. *Accounting, Organizations and Society, 32*(7/8), 601-637.

Chenhall, R. H., & Langfield-Smith, K. (1998a). Factors influencing the role of management accounting in the development of performance measures within organizational change programs. *Management Accounting Research, 9*(4), 361-386.

Chenhall, R. H., & Langfield-Smith, K. (1998b). The relationship between strategic priorities, management techniques and management accounting: an empirical investigation using a systems approach. *Accounting, Organizations and Society, 23*(3), 243-264.

Chenhall, R. H., & Langfield-Smith, K. (2003). Performance measurement and reward systems, trust, and strategic change. *Journal of Management Accounting Research, 15*, 117-143.

Chenhall, R. H., & Morris, D. (1986). The impact of structure, environment, and interdependence on the perceived usefulness of management accounting systems. *The Accounting Review, 61*(1), 16-35.

Chin, W. (1998). *The partial least squares approach to structural equation modelling, in modern methods for business research.* New Jersey: Lawrence Erlbaum Associates.

Choe, J. (2004). Impact of management accounting information and AMT on organizational performance. *Journal of Information Technology, 19,* 203-214.

Chong, V. K., & Chong, K. M. (1997). Strategic choices, environmental uncertainty and SBU performance: A note on the intervening role of management accounting systems. *Accounting and Business Research, 27*(4), 268-276.

Chow, C. W., Shields, M. D., & Wu, A. (1999). The importance of national culture in the design of and preference for management controls for multi-national operations. *Accounting, Organizations and Society, 24*(5-6), 441-461.

Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management, 23*(3), 239-252.

Cooper, D. R., & Schindler, P. S. (2001). *Business research methods.* (7th ed.). Singapore: McGraw-Hill.

Dalton, D. R., Todor, W. D., Spendolini, M. J., Fielding, G. J., & Porter, L. W. (1980). Organization structure and performance: A critical review. *Academy of Management Review, 5*(1), 49-64.

Davenport, T. H. (2000). *Mission critical: Realising the promise of enterprise systems.* Boston, MA: Harvard Business School Press.

Davila, T. (2000). An empirical study of the drivers of management control systems' design in new product development. *Accounting, Organizations and Society, 25,* 383-409.

DeLisi, P. S. (1990). Lessons from the Steel Axe: Culture, technology, and organizational change. *Sloan Management Review, 32*(1), 83-93.

Dibrell, C. C., & Miller, T. R. (2002). Organization design: The continuing influence of information technology. *Management Decision, 40*(5/6), 620-627.

Dillman, D. (1978). *Mail and telephone surveys: the total design method.* New York: John Wiley & Sons.

Donaldson, L. (2001). *The contingency theory of organizations.* Thousand Oaks, CA: Sage Publications.

Emmanuel, C., Otley, D., & Merchant, K. (1990). *Accounting for management control.* (2nd ed.). London: Chapman & Hall.

Feurer, R., & Chaharbaghi, K. (1995). Performance measurement in strategic change. *Benchmarking for Quality Management &Technology, 2*(2), 64-83.

FMM. (2008). *FMM Directory 2008: Malaysian Industries* (39th ed.). Kuala Lumpur: Federation of Malaysian Manufacturers.

Fuschs, P. H., Mifflin, K. E., Miller, D., & Whitney, J. O. (2000). Strategic integration: Competing in the age of capabilities. *California Management Review, Spring*, 118-147.

Garson, G. D. (2009). Structural equation modeling. *Online Article, http://faculty.chass.ncsu.edu/garson/PA765/structur/htm*.

Gerdin, J. (2005). Management accounting system design in manufacturing departments: an empirical investigation using a multiple contingencies approach. *Accounting, Organizations and Society, 30*(2), 99-126.

Gerdin, J., & Greve, J. (2004). Forms of contingency fit in management accounting research - A critical review. *Accounting, Organizations and Society, 29*, 303-326.

Gibbons, J. D. (1993). The use of nonparametric methods in tax research. *The Journal of the American Taxation Association, 15*(1), 110-120.

Gomes, C. F., Yasin, M. M., & Lisboa, J. V. (2007). The dimensionality and utilization of performance measures in a manufacturing operational context: Organizational change implications. *Cross Cultural Management: An International Journal, 14*(4), 286-306.

Gordon, L. A., & Miller, D. (1976). A contingency framework for the design of accounting information systems. *Accounting, Organizations and Society, 1*(1), 59-69.

Gordon, L. A., & Narayanan, V. K. (1984). Management accounting systems, perceived environmental uncertainty and organization structure: An empirical investigation. *Accounting, Organizations and Society*, 56-69.

Gosselin, M. (1997). The effect of strategy and organizational structure on the adoption and implementation of activity-based costing. *Accounting, Organizations and Society, 22*(2), 105-122.

Govindarajan, V., & Gupta, A. K. (1985). Linking control systems to business unit strategy: impact on performance. *Accounting, Organizations and Society, 10*(1), 51-66.

Granlund, M. (2001). Towards explaining stability in and around management accounting systems. *Management Accounting Research, 12*, 141-166.

Gurd, B., & Thorne, H. (2003). The transformation of an accounting system during organisational change: A longitudinal study. *Financial Accountability & Management, 19*(1), 21-43.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis.* (6th ed.). New Jersey: Pearson Prentice Hall.

Haldma, T., & Laats, K. (2002). Contingencies influencing the management accounting practices of Estonian manufacturing companies. *Management Accounting Research, 13*(4), 379-400.

Hambrick, D. D. (1980). Operationalizing the concept of business-level strategy in research. *Academy of Management Review, 5*, 567-575.

Harris, M. (1996). Organizational politics, strategic change and the evaluation of CAD. *Journal of Information Technology, 11*(1), 51-58.

Hassan, M. K. (2005). Management accounting and organizational change: An institutional perspective. *Accounting & Organizational Change, 1*(2), 125-140.

Henri, J. (2007). A quantitative assessment of the reporting of structural equation modeling information: The case of management accounting research. *Journal of Accounting Literature, 26*, 76-115.

Holmes-Smith, P. (2005). *Introduction to structural equation modeling using LISREL.* The University of Queensland: School Research, Evaluation and Measurement Services.

Hopwood, A. G. (1987). The archeology of accounting systems. *Accounting, Organizations and Society, 12*(3), 207-234.

Hopwood, A. G. (1990). Accounting and organization change. *Accounting, Auditing & Accountability Journal, 3*(1), 7-17.

Hoque, Z. (2000). Just-In-Time production, automation, cost allocation practices and importance of cost information: An empirical investigation in New Zealand-based manufacturing organizations. *The British Accounting Review, 32*, 133-159.

Hoque, Z. (2004). A contingency model of the association between strategy, environmental uncertainty and performance measurement: Impact on organizational performance. *International Business Review, 13*(4), 485-502.

Hoque, Z. (2005). Linking environmental uncertainty to non-financial performance measures and performance: A research note. *The British Accounting Review, 37*(4), 471-481.

Hoque, Z., & Hopper, T. (1994). Rationality, accounting and politics: A case study of management control in a Bangladeshi Jute Mill. *Management Accounting Research, 5*(1), 5-30.

Hoque, Z., & James, W. (2000). Linking balance scorecard measures to size and market factors: Impact on organizational performance. *Management Accounting Research, 12*, 1-17.

Hoque, Z., Mia, L., & Alam, M. (2001). Market competition, computer-aided manufacturing and use of multiple performance measures: An empirical study. *The British Accounting Review, 33*(1), 23-45.

Horngren, C. (1995). Management accounting: This century and beyond. *Management Accounting Research, 6*, 281-286.

Horngren, C., Sundem, G., Stratton, W., Burgstahler, D., & Schatzberg, J. (2007). *Introduction to management accounting.* (14th ed.). New Jersey: Pearson Prentice Hall.

Hult, G. T., Ketchen Jr., D. J., Cui, A. S., Prud'homme, A. M., Seggie, S. H., Stanko, M. A., et al. (2006). An assessment of the use of the structural equation

modeling in international business research. *Research Methodology in Strategy and Management, 3*, 385-415.

Hussain, M., & Hoque, Z. (2002). Understanding non-financial performance measurement practices in Japanese banks: A new institutional sociology perspective. *Accounting, Auditing & Accountability Journal, 15*(2), 162-183.

Huy, Q. N. (2001). Time, temporal capability, and planned change. *Academy of Management. The Academy of Management Review, 26*(4), 601-623.

Hyvönen, J. (2007). Strategy, performance measurement techniques and information technology of the firm and their links to organizational performance. *Management Accounting Research, 18*(3), 343-366.

IFAC. (1998). *International Management Accounting Practice Statement: Management Accounting Concepts,* New York.

Innes, J., & Mitchell, F. (1990). The process of change in management accounting: Some field study evidence. *Management Accounting Research, 1*, 3-19.

Innes, J., & Mitchell, F. (1995). A survey of activity based costing in the UK's large companies. *Management Accounting Research, 6*(2), 137-153.

Ittner, C. D., & Larcker, D. F. (1995). Total quality management and the choice of information and reward systems. *Journal of Accounting Research, 33*(Supplement), 1-34.

Jarvenpaa, M. (2007). Making business partners: A case study on how management accounting culture was changed. *European Accounting Review, 16*(1), 99-142.

Jermias, J., & Gani, L. (2002, 27-29 Oct 2002). *Linking strategic priroties, organizational configurations and management accounting systems with business unit effectiveness: Experience from Indonesian publicly held companies.* Paper presented at the 3rd Conference AAA, Nagoya, Japan.

Johnson, H. T., & Kaplan, R. S. (1987). Relevance lost: the rise and fall of management accounting. *Harvard Business School Press, Cambridge, MA*.

Kaplan, R. S. (1989). Management accounting for advanced technological environments. *Science, 245*(4920), 819-823.

Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard-measures that drive performance. *Harvard Business Review, 70*, 71-79.

Kaplan, R. S., & Norton, D. P. (1996). *The balance scorecard: Translating strategy into action.* Boston, MA: Harvard Business School Publishing.

Kassim, M. Y., Md-Mansur, K., & Idris, S. (2003). Globalization and its impact on Malaysia economy. *Reinventing Sabah: Global Challenges and Policy Responses,* 95-111.

Kaynak, H., & Hartley, J. L. (2006). Using replication research for just in time purchasing construct development. *Journal of Operation Management, 24*, 868-892.

Keidal, R. W. (1994). Rethinking Organizational Design. *Academy of Management Executive, 8*(4), 12-17.

Khandwalla, P. N. (1974). Mass output Orientation of operations technology and organizational structure. *Administrative Science Quarterly, March*, 74-97.

Kline, R. B. (1998). *Principles and practice of structural equation modeling.* New York: The Guilford Press.

Kloot, L. (1997). Organizational learning and management control systems: Responding to environmental change. *Management Accounting Research, 8*(1), 47-73.

Kober, R., Ng, J., & Paul, B. J. (2007). The interrelationship between management control mechanisms and strategy. *Management Accounting Research, 18*(4), 425-452.

Kotha, S., & Swamidass, P. M. (2000). Strategy, advanced manufacturing technology and performance: Empirical evidence from U.S manufacturing firms. *Journal of Operations Management, 18*(3), 257-277.

Laitinen, E. K. (2001). Management accounting change in small technology companies: Towards a mathematical model of the technology firm. *Management Accounting Research, 12*(4), 507-541.

Laitinen, E. K. (2006). Explaining management accounting change: Evidence from Finland. *International Journal Accounting, Auditing and Performance Evaluation, 3*(2), 252-281.

Langfield-Smith, K. (1997). Management control systems and strategy: A critical review. *Accounting, Organizations and Society, 22*(2), 207-232.

Lapsley, I., & Pallot, J. (2000). Accounting management and organizational change: A comparative study of local government. *Management Accounting Research, 11*(2), 213-229.

Li, M., & Ye, L. (1999). Information technology and firm performance: Linking with environmental, strategic and managerial context. *Journal of Information Management, 35*, 43-51.

Libby, T., & Waterhouse, J. H. (1996). Predicting change in management accounting systems. *Journal of Management Accounting Research, 8*, 137-150.

Ling-Yee, L., & Ogunmokun, G. O. (2008). An empirical study of manufacturing flexibility of exporting firms in China: How do strategic and organizational contexts matter? *Industrial Marketing Management, 37*(6), 738-751.

Lucas, H. C., & Baroudi, J. (1994). The role of information technology in organization design. *Journal of Management Information Systems, 10*(4), 9-23.

Luft, J. L. (1997). Long-term change in management accounting: Perspectives from historical research. *Journal of Management Accounting Research, 9*, 163-197.

Luther, R., & Longden, S. (2001). Management accounting in companies adapting structural change and volatility in transition economies: A South African study. *Management Accounting Research, 12*, 299-320.

Ma, Y., & Tayles, M. (2009). On the emergence of strategic management accounting: an institutional perspective. *Accounting and Business Research, 39*(5), 473-495.

Macy, G., & Arunachalam, V. (1995). Management accounting systems and contingency theory: In search of effective systems. *Advances in Management Accounting, 4*, 63-86.

Matejka, M., & De Waegenaere, A. (2000). Organizational design and management accounting change. *Center for Economic Research, Tilburg University, Netherlands*.

Mia, L., & Clarke, B. (1999). Market competition, management accounting systems and business unit performance. *Management Accounting Research, 10*, 137-158.

Michael, J. H., Barsness, Z. I., Lawson, L., & Balkundi, P. (2004). Focus please: Team coordination and performance at a wood manufacturer. *Forest Products Journal, 54*(12), 250-255.

Miles, R. E., & Snow, C. C. (1978). *Organizational strategy, structure and process.* New York: McGraw Hill.

Miller, D., & Friesen, P. H. (1982). Structural change and performance: Quantum versus piecemeal-incremental approaches. *Academy of Management Journal 25*(4), 867-892.

Moores, K., & Mula, J. (1993). Contextual and strategic impacts on the form of management accounting system. *School of Business Discussion Paper, Bond University*.

Moores, K., & Yuen, S. (2001). Management accounting systems and organization configuration: A life-cycle perspective. *Accounting, Organizations and Society, 26*, 351-389.

Morton, N. A., & Hu, Q. (2008). Implications of the fit between organizational structure and ERP: A structural contingency theory perspective. *International Journal of Information Management, 28*, 391-402.

Naranjo-Gil, D., & Hartmann, F. (2007). Management accounting systems, top management team heterogeneity and strategic change. *Accounting, Organizations and Society, 32*(7/8), 735-756.

Nardi, P. (2006). *Doing survey research: A guide to quantitative methods.* Boston, MA: Person Education Inc.

Nor-Aziah, A. K., & Scapens, R. W. (2007). Corporatisation and accounting change: The role of accounting and accountants in a Malaysian public utility. *Management Accounting Research, 18*, 209-247.

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Nunnally, J. C. (1978). *Psychometric theory.* (2nd ed.). New York: McGraw Hill.

Omar, N., Abd-Rahman, I. K., & Sulaiman, S. (2004). Management accounting in Malaysia - Has relevance been lost? *Accountants Today, November,* 26-28.

Otley, D. (1980). The contingency theory of management accounting: Achievement and prognosis. *Accounting, Organizations and Society, 5*(4), 413-428.

Perera, S., Harrison, G. L., & Poole, M. (1997). Customer-focused manufacturing strategy and the use of operations-based non-financial performance measures: A research note. *Accounting, Organizations and Society, 22*, 557-572.

Perera, S., McKinnon, J. L., & Harrison, G. L. (2003). Diffusion of transfer pricing innovation in the context of commercialization-A longitudinal case study of a government trading enterprise. *Management Accounting Research, 14*(2), 140-164.

Pinsonneault, A., & Kraemer, K. L. (1993). Survey research methodology in management information systems: An assessment. *Journal of Information Management Systems, 10*(2), 75-85.

Pitts, R. A. (1980). Toward a Contingency Theory of Multibusiness Organization Design. *Academy of Management. The Academy of Management Review, 5*(2), 203-210.

Porter, M. E. (1980). *Competitive strategy.* New York: The Free Press.

Porter, M. E. (1996). What is strategy? *Harvard Business Review, 74*(6), 61-78.

Pratt, Z. L. (2004). *An investigation of the relationships between external environment, mission and strategy, leadership, organizational culture, and performance.* Unpublished Ph.D., Michigan State University, United States -- Michigan.

Quattrone, P., & Hopper, T. (2001). What does organizational change mean? Speculations on a taken for granted category. *Management Accounting Research, 12*(4), 403-435.

Rasiah, R. (1995). *Foreign capital and industrialization in Malaysia.* (Vol. xvi). New York: St. Martin's Press.

Rowe, C., Birnberg, J. G., & Shields, M. D. (2008). Effects of organizational process change on responsibility accounting and managers' revelations private knowledge. *Accounting, Organizations and Society, 33*, 164-198.

Scapens, R. W. (1999). Broadening the Scope of Management Accounting: From a Micro-economic to a Broader Business Perspective. Unpublished Working Paper. Working Paper, University of Manchester, Manchester, September.

Schroeder, D. M., & Congden, S. W. (2000). Aligning competitive strategies, manufacturing technology, and shop floor skills. *Production and Inventory Management Journal 41*(4), 40-47.

Schumacker, R. E., & Lomax, R. G. (1996). *A beginner's guide to structural equation modelling.*: NJ: Lawrence Erlbaum Associates.

Schwarz, G. M., & Shulman, A. D. (2007). The patterning of limited structural change. *Organizational Change Management, 20*(6), 829-846.

Scott, T. W., & Tiessen, P. (1999). Performance measurement and managerial teams. *Accounting, Organizations and Society, 24*, 263-285.

Seal, W. (2001). Management accounting and the challenge of strategic focus. *Management Accounting Research, 12*(4), 487-506.

Sekaran, U. (2003). *Research methods for business: A skill building approach.* (4th ed.). Singapore: Joh Wiley & Sons (Asia) Pte Ltd.

Shields, M. D. (1997). Research in management accounting by North Americans in the 1990s. *Journal of Management Accounting Research, 9*, 3-61.

Shook, C. L., Ketchen Jr., D. J., Hult, G. T., & Kacmar, K. M. (2004). An assessment of the use of structural equation modelling in strategic management research. *Strategic Management Journal, 25*, 397-404.

Sim, K. L., & Killough, L. N. (1998). The performance effects of complimentarities between manufacturing practices and management accounting systems. *Management Accounting Research, 10*, 325-346.

Simons, R. (1987). Accounting control systems and business strategy: An empirical analysis. *Accounting, Organizations and Society, 12*, 357-374.

Sisaye, S. (2003). Process innovation and adaptive institutional change strategies in management control systems: Activity based costing as administrative innovation. *Advances in Management Accounting, 11*, 251-285.

Smith, D., & Langfield-Smith, K. (2004). Structural equation modeling in management accounting research: Critical analysis and opportunities. *Journal of Accounting Literature, 23*, 49-86.

Smith, J. A., Morris, J., & Ezzamel, M. (2005). Organisational change, outsourcing and the impact on management accounting. *The British Accounting Review, 37*(4), 415-441.

Smith, M. (2003). *Research methods in accounting*. London: SAGE Publications Inc.

Smith, M., Abdullah, Z., & Abdul-Razak, R. (2008). The diffusion of technological and management accounting innovation: Malaysian evidence. *Asian Review of Accounting, 16*(3), 197-218.

Soin, K., Seal, W., & Cullen, J. (2002). ABC and organizational change: An institutional perspective. *Management Accounting Research, 13*(2), 249-271.

Soper, D. S. (2009). The free statistics calculators website. *Önline Software, http://www.danielsoper.com/statcalc/*.

Subramaniam, N., & Mia, L. (2001). The relation between decentralised structure, budgetary participation and organization commitment. *Accounting, Auditing & Accountability Journal, 14*(1), 12-29.

Sulaiman, S., & Mitchell, F. (2005). Utilising a typology of management accounting change: An empirical analysis. *Management Accounting Research, 16*(4), 422-437.

The American Heritage Dictionary (2000). The American Heritage Dictionary of the English Language (4th ed.). Harcourt: Houghton Mifflin.

Tybout, J. R. (2000). Manufacturing firms in developing countries: How well do they do, and why? *Journal of Economic Literature, 108*, 11-44.

Vaivio, J. (1999). Exploring a 'non-financial' management change. *Management Accounting Research, 10*, 409-437.

Vamosi, T. (2003). The role of management in a company transition from command to market economy *Small Business and Enterprise Development, 10*(2), 194-209.

Van der Stede, W. A., Young, S. M., & Chen, C. X. (2007). Doing management accounting survey research. *Handbook of Management Accounting Research, 1*, 445-478.

Verbeeten, F. (2010). The impact of business unit strategy, structure and technical innovativeness on change in management accounting systems. *International Journal of Management, 27*(1), 123-143.

Waclawski, J. (1996). *Large-scale organizational change and organizational performance.* Unpublished Ph.D., Columbia University, United States -- New York.

Waldron, M. (2005). Overcoming barriers to change in management accounting systems. *The Journal of American Academy of Business, Cambridge*(2), 244-249.

Waterhouse, J. H., & Tiessen, P. (1978). A contingency framework for management accounting system research. *Accounting, Organizations and Society, 3*, 65-76.

Waweru, N. M., Hoque, Z., & Uliana, E. (2004). Management accounting change in South Africa. *Accounting, Auditing & Accountability Journal, 17*(5), 675-704.

Weill, P., & Olson, M. H. (1989). An assessment of the contingency theory of management information system. *The Journal of Management Information System, 6*(1), 59-85.

Wickramasinghe, D., & Alawattage, C. (2007). *Management accounting change: approaches and perspectives.* London and New York: Routledge, Taylor & Francis Group.

Zikmund, W. G. (2003). *Business research methods.* (7th ed.). Ohio: Thomson Learning.

APPENDICES

APPENDIX A: **Information Letter and Questionnaire**

Information Letter

Dear Sir/Madam,

You are invited to participate in a study which is being conducted as a requirement toward the degree Doctor of Philosophy (Interdisciplinary Studies) at Edith Cowan University, Perth, Western Australia. This study is designed to investigate how the alignment of management accounting system with organizational structure and strategy effect on performance.

The usefulness and potential positive outcomes of the study will depend upon the honesty and care with which you answer the questions. Please read the instructions for each section carefully. Choose a response that gives the best indication of how you would typically think, feel and experience. You will require about 15 to 20 minutes completing the questionnaire.

This is an anonymous questionnaire. No personally identifiable information will be collected from you. Participation in this project is entirely voluntary. All data will be treated with the strictest confidence and will only be used for the purposes of this study. If the information you provide is published, you will not be identified in any written work, since the data will be aggregated prior to presentation.

If you have any questions or require any further information regarding this research, please contact:

Tuan Zainun Tuan Mat	Professor Malcolm Smith
Postgraduate Office	(Principal Supervisor)
Faculty of Accountancy	Edith Cowan University
Menara S.A.A.S.	Faculty of Business and Law
Universiti Teknologi MARA	270 Joondalup Drive
40450 Shah Alam	Joondalup W.A. 6027
Selangor, Malaysia.	Perth, Australia.
Email: ttuanmat@student.ecu.edu.au	Email: malcolm.smith@ecu.edu.au

If you have any concerns or complaints about the study and wish to speak to an independent person, you may contact:
Research Ethics Officer
Edith Cowan University
Phone: +61 8 63042170
Email: research.ethics@ecu.edu.au

Please return the completed questionnaire using a reply paid envelope.
If you wish to have a copy of the result of this research, please complete the attached form and return it using the separate reply paid envelope.

Thank you for your participation.

Questionnaire Survey on:

Management Accounting and Organizational Change: Impact on Organizational Performance.

*This is an anonymous questionnaire. Please read the Information Letter carefully as it provides details of the project. By completing the questionnaire, you are consenting to take part in this survey. You are not required to provide your name as part of the survey. **Your reply to the survey will be strictly confidential**. You have a chance to give any comments or suggestions at the end of this questionnaire. Should you be interested in the results of this survey please fill your name and contact details using separate form attach here, or email to me directly, in order to maintain confidentiality. Thank you.*

(Email: z_tuan@yahoo.com or ttuanmat@student.ecu.edu.au)

This questionnaire has five sections (Section A to E). Please answer all the questions.

SECTION A

This section seeks general information about your organization.

Please choose a relevant box.

1)   Industry Classification:

☐   Electrical and electronics
☐   Engineering supporting
☐   Food processing
☐   Life sciences
☐   Machinery and equipment
☐   Petrochemical and polymer
☐   Rubber products
☐   Textiles and apparel
☐   Transport equipment
☐   Basic metal products
☐   Wood-based
☐   Other (please specify:)

2) Type of Company:
- ☐ Local company
- ☐ Foreign company

3) Type of Product:
- ☐ Consumer product
- ☐ Industrial product
- ☐ Other (please specify:)

4) Total number of employees:
- ☐ Less than 50
- ☐ 50 - 150
- ☐ 151 - 500
- ☐ 501 – 1,000
- ☐ Over 1,000

SECTION B

This section seeks information on environmental and technological changes in your company over the past five years (2003-2007 inclusive).

5) Please indicate the extent to which you believe the competitive environment of your business unit has changed over the past 5 years.
Please choose your response on a scale of -5 to +5, or N/A if the items are not applicable in your organization.

Competitive Environment:

	Significantly less competitive						Significantly more competitive					
	-5	-4	-3	-2	-1	0	1	2	3	4	5	N/A
a) Price competition	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
b) Competition for new product development	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
c) Marketing/distribution channels competition	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
d) Competition for markets/revenue share	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
e) Competitors' action	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
f) No. of competitors in your market segments	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

6) Please indicate the extent to which the use of particular advanced technologies has changed in your business unit over the past 5 years.
Please choose your response on a scale of -5 to +5, or N/A if the items are not applicable in your organization.

Advanced Manufacturing Technology (AMT):

	Used significantly less										Used significantly more	
	-5	-4	-3	-2	-1	0	1	2	3	4	5	N/A
a) Robotics	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
b) Flexible manufacturing system (FMS)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
c) Computer aided manufacturing (CAM)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
d) Computer aided design (CAD)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
e) Computer aided engineering (CAE)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
f) Computer aided process planning (CAPP)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
g) Testing machines	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
h) Just-in-time (JIT)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
i) Direct numerical control	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
j) Computer integrated manufacturing (CIM)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
k) Numerical control (NC)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

This section seeks information on organizational changes in your company over the past five years (2003-2007 inclusive).

7) Please indicate the extent to which the use of a range of organizational design practices below had changed over the past 5 years.
Please choose your response on a scale of -5 to +5, or N/A if the items are not applicable in your organization.

Organizational Design Practices:

	Used significantly less	Used significantly more
	-5 -4 -3 -2 -1 0 1 2 3 4 5 N/A	

a) Multi-skilling of workforce

b) Worker training

c) Cross-functional teams

d) Establishing participative culture

e) Management training

f) Flattening of formal organizational structures

g) Work-based teams

h) Employee empowerment

i) Manufacturing cells

8) Please indicate the extent to which your business unit has changed its strategic emphasis for the following differentiation aspects, during the past 5 years.
Please choose your response on a scale of -5 to +5, or N/A if the items are not applicable in your organization.

Organizational Strategy:

	Emphasized significantly less	Emphasized significantly more
	-5 -4 -3 -2 -1 0 1 2 3 4 5 N/A	

a) Provide on time delivery

b) Make dependable delivery promises

c) Provide high quality products

d) Provide effective after sales service & support

e) Make changes in design & introduce quickly

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f) Customize products & services
   to customer
   need

☐☐☐☐☐☐☐☐☐☐☐☐

g) Product availability
   (broad distribution)

☐☐☐☐☐☐☐☐☐☐☐☐

h) Make rapid volume/product
   mix changes

☐☐☐☐☐☐☐☐☐☐☐☐

SECTION D

This section seeks information on changes in management accounting practices in your company over the past five years (2003-2007 inclusive).

9) Please indicate the extent to which the use of a range of management accounting techniques has changed over the past 5 years
Please choose your response on a scale of -5 to +5, or N/A if the items are not applicable in your organization.

Management Accounting Techniques:

	Used significantly Less										Used significantly more	
	-5	-4	-3	-2	-1	0	1	2	3	4	5	N/A
a) Budgetary control	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
b) Full/ Absorption costing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
c) Cost-volume-profit (CVP) analysis	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
d) Variable/ Marginal costing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
e) Standard costing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
f) Total Quality Management (TQM)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
g) Target costing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
h) Activity Based Costing (ABC)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
i) Activity Based Management (ABM)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
j) Value chain analysis	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
k) Product life cycle analysis	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
l) Benchmarking	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
m) Product profitability analysis	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
n) Customer profitability analysis	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
o) Shareholder value analysis / EVA	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

10) For each of the management accounting practices below indicate the technical level changes occurring in your company for the past 5 years in accordance to the given categories.

Please choose the appropriate category as listed below:

0	No change
1	Introduction of new techniques where no management accounting techniques previously existed (e.g. the first time introduction of a new management accounting techniques).
2	Introduction of new techniques as replacements for an existing part of the management accounting system (e.g. the replacement of any traditional techniques with more advanced techniques or of a fixed budgeting system with flexible budgeting).
3	Modification of the information or output of the management accounting system (e.g. the preparation of monthly as opposed yearly budget or the re-presentation).
4	Modification of technical operation of the management accounting system (e.g. The use of pre-determined as opposed to actual overhead rate in existing costing system).
5	The removal of management accounting technique with no replacement (abandonment).
N/A	Management accounting technique is not practiced in the organization.

Management Accounting Techniques: Please choose one of the types of change as defined in the above box by double click at relevant boxes

	0	1	2	3	4	5	N/A
a) Budgetary control	☐	☐	☐	☐	☐	☐	☐
b) Full/ Absorption costing	☐	☐	☐	☐	☐	☐	☐
c) Cost-volume-profit (CVP) analysis	☐	☐	☐	☐	☐	☐	☐
d) Variable/ Marginal costing	☐	☐	☐	☐	☐	☐	☐
e) Standard costing	☐	☐	☐	☐	☐	☐	☐
f) Total Quality Management (TQM)	☐	☐	☐	☐	☐	☐	☐
g) Target costing	☐	☐	☐	☐	☐	☐	☐
h) Activity Based Costing (ABC)	☐	☐	☐	☐	☐	☐	☐
i) Activity Based Management (ABM)	☐	☐	☐	☐	☐	☐	☐
j) Value chain analysis	☐	☐	☐	☐	☐	☐	☐
k) Product life cycle analysis	☐	☐	☐	☐	☐	☐	☐
l) Benchmarking	☐	☐	☐	☐	☐	☐	☐
m) Product profitability analysis	☐	☐	☐	☐	☐	☐	☐
n) Customer profitability analysis	☐	☐	☐	☐	☐	☐	☐
o) Shareholder value analysis / EVA	☐	☐	☐	☐	☐	☐	☐

This section seeks information on changes in your company's performance over the past five years (2003-2007 inclusive).

11) Please compare the change of your business unit's performance with that of its competitors over the past 5 years.

Please choose your response on a scale of -5 to +5, or N/A if the items are not applicable in your organization.

Organizational Performance:

	Significantly lower performance than competitors										Significantly higher performance than competitors	
	-5	-4	-3	-2	-1	0	1	2	3	4	5	N/A
a) Operating income	□	□	□	□	□	□	□	□	□	□	□	□
b) Sales growth	□	□	□	□	□	□	□	□	□	□	□	□
c) Return on investment	□	□	□	□	□	□	□	□	□	□	□	□
d) Cash flow from operations	□	□	□	□	□	□	□	□	□	□	□	□
e) Market share	□	□	□	□	□	□	□	□	□	□	□	□
f) Market development	□	□	□	□	□	□	□	□	□	□	□	□
g) New product development	□	□	□	□	□	□	□	□	□	□	□	□
h) Research and development (R&D)	□	□	□	□	□	□	□	□	□	□	□	□
i) Cost reduction programs/cost control	□	□	□	□	□	□	□	□	□	□	□	□
j) Personnel development	□	□	□	□	□	□	□	□	□	□	□	□
k) Workplace relations	□	□	□	□	□	□	□	□	□	□	□	□
l) Employee health and safety	□	□	□	□	□	□	□	□	□	□	□	□

12) Please indicate the extent to which the following performance indicators are important to your business unit.

Please choose your response on a scale of 1 to 5, or N/A if the items are not applicable in your organization.

Organizational Performance:	No Importance				Extremely important	
	1	2	3	4	5	N/A
a) Operating income	☐	☐	☐	☐	☐	☐
b) Sales growth	☐	☐	☐	☐	☐	☐
c) Return on investment	☐	☐	☐	☐	☐	☐
d) Cash flow from operations	☐	☐	☐	☐	☐	☐
e) Market share	☐	☐	☐	☐	☐	☐
f) Market development	☐	☐	☐	☐	☐	☐
g) New product development	☐	☐	☐	☐	☐	☐
h) Research and development (R&D)	☐	☐	☐	☐	☐	☐
i) Cost reduction programs/ cost control	☐	☐	☐	☐	☐	☐
j) Personnel development	☐	☐	☐	☐	☐	☐
k) Workplace relations	☐	☐	☐	☐	☐	☐
l) Employee health and safety	☐	☐	☐	☐	☐	☐

If you have any comments or suggestion on the questionnaire, please provide it on the space below:

COMMENTS/SUGGESTIONS:

1)

2)

3)

4)

5)

"End of questionnaire"

APPENDIX B:

1. **Sample Representation by Industrial Sectors**

	Responses	Sample	Sample Representation (%)
Electrical and electronics	57	138	41
Engineering Supporting	3	14	21
Food Processing	20	110	18
Life Sciences	3	12	24
Machinery and equipment	15	96	16
Petrochemical and polymer	14	48	29
Rubber products	14	61	23
Transport equipment	3	17	18
Basic metal products	23	94	25
Wood based	2	15	13
Publishing	3	10	30
Shipping	3	17	18
Information technology	8	48	17
Automotive	9	57	16
Paints & coatings	6	32	19
Fertilizers	6	28	21
Stationery	3	27	11
Plastic	6	42	14
Yachts builders	3	17	18
Cosmetics and toiletries products	6	67	9
Chemicals	5	50	10
Total	**212**	**1,000**	

2. Demographic Statistics

	Frequency	Percentage
Type of Companies:		
Local	139	68
Foreign	73	32
Total	**212**	**100**
Type of Product:		
Consumer	84	40
Industrial	108	51
Both	20	9
Total	**212**	**100**
Number of Employees:		
Less than 50	25	12
50 – 150	102	48
151 – 500	34	16
501 – 1,000	21	10
More than 1,000	30	14
Total	**212**	**100**

Competitive Environment

List of Constructs and Measures	Skewness	Kurtosis
7. Competitors action	-0.83	0.30
8. Marketing/distribution channels competition	-0.32	-0.74
9. Competition for markets/revenue share	-0.90	0.54
10. No. Of competitors in market segments	-1.21	2.39
11. Price competition	-1.56	0.86
12. Competition for new product development	-1.75	5.32

Advanced Manufacturing Technologies

Variables	Skewness	Kurtosis
12. Computer aided process planning (CAPP)	-1.13	2.29
13. Computer aided engineering (CAE)	-0.99	2.56
14. Computer aided design (CAD)	-1.01	1.80
15. Computer aided manufacturing system (CAM)	-0.87	1.50
16. Computer integrated manufacturing (CIM)	-1.05	2.19
17. Testing machines	-0.57	0.04
18. Numerical control	-0.77	2.00
19. Just-in-time	-0.53	1.31
20. Robotics	-1.05	3.22
21. Flexible manufacturing system (FMS)	-0.41	1.16
22. Direct numerical control	-0.19	1.82

Organizational Structures

List of Constructs and Measures	Skewness	Kurtosis
10. Manufacturing cells	0.04	-0.55
11. Work-based teams	-0.31	-0.68
12. Employee empowerment	-1.17	2.99
13. Flattening of formal organizational structures	-0.16	-0.81
14. Multi-skilling of workforce	-1.26	3.71
15. Worker training	-1.08	1.32
16. Management training	-0.96	1.22
17. Cross-functional teams	-0.67	0.05
18. Establishing participative culture	-0.14	-0.57

Organizational Strategy

Variables	Skewness	Kurtosis
9. Make changes in design & introduce quickly	-0.93	1.85
10. Customize products & services to customer need	-0.77	1.02
11. Product availability (broad distribution)	-0.76	1.41
12. Provide effective after sales service & support	-1.47	3.67
13. Make rapid volume/product mix changes	-0.41	-0.13
14. Provide on time delivery	-0.85	-0.24
15. Provide high quality products	-1.08	0.39
16. Make dependable delivery promise	-0.82	0.05

Management Accounting Practices

Variables	Skewness	Kurtosis
16. Standard costing	-0.42	-0.70
17. Product life cycle analysis	-0.37	0.69
18. Value chain analysis	-0.26	-0.21
19. Target Costing	-0.27	0.42
20. Benchmarking	-0.08	-0.69
21. TQM	-0.49	-0.24
22. Full/Absorption Costing	-0.65	1.45
23. Product profitability analysis	-0.87	1.03
24. Budgetary control	-1.01	-0.13
25. Shareholder value analysis	-1.35	4.79
26. Customer profitability analysis	-0.84	0.30
27. CVP analysis	-0.71	0.72
28. Activity Based Costing (ABC)	-0.20	0.14
29. Activity Based Management (ABM)	-0.06	0.22
30. Variable/marginal costing	-0.66	0.07

Performance

Variables	Skewness	Kurtosis
13. Operating income	-0.41	-0.33
14. Cash flow from operations	-0.32	-0.09
15. Sales growth	-0.31	-0.70
16. Market share	0.04	-0.63
17. Return on investment	0.32	-0.32
18. Personnel development	-0.23	-0.25
19. Employee health and safety	-0.03	-0.74
20. Workplace relations	-0.07	-0.55
21. Cost reduction programs/ cost control	-0.28	-0.60
22. Research and development (R&D)	-0.08	-0.75
23. New product development	-0.11	-0.32
24. Market development	-0.06	-0.55

APPENDIX D: **SEM Output**

Number of Input Variables   =   6
Number of Y-Variables   =   4
Number of X-Variables   =   2
Number of ETA-Variables   =   4
Number of KSI-Variables   =   2
Number of Observations   =   212

Covariance Matrix

	Structure	Strategy	MAP	Performance	Competition	AMT
Structure	1.13					
Strategy	0.84	1.35				
MAP	0.70	0.92	1.24			
Performance	4.66	5.40	5.40	69.23		
Competitive	0.54	0.71	0.48	2.81	1.27	
AMT	0.42	0.38	0.35	2.14	0.31	1.57

Parameter Specifications:

BETA

	Structure	Strategy	MAP	Performance
Structure	0	0	1	0
Strategy	0	0	2	0
MAP	3	4	0	0
Performance	5	6	7	0

GAMMA

	Competition	AMT
Structure	0	0
Strategy	8	9
MAP	0	10
Performance	0	0

PHI

	Competition	AMT
Competition	11	
AMT	12	13

PSI

Structure	Strategy	MAP	Performance
14	15	16	17

LISREL Estimates (Maximum Likelihood):

BETA

	Structure	Strategy	MAP	Performance
Structure	-	-	0.98 (0.12) 8.09	-
Strategy	-	-	0.09 (0.13) 0.64	-
MAP	1.04 (0.27) 3.88	1.22 (0.15) 7.95	-	-
Performance	1.81 (0.60) 3.00	1.83 (0.63) 2.91	1.54 (0.59) 2.61	-

GAMMA

	Competition	AMT
Structure	-	-
Strategy	0.50 (0.07) 7.04	0.13 (0.06) 2.25
MAP	-	0.20 (0.08) 2.47
Performance	-	-

PHI

	Competition	AMT
Competition	1.27 (0.12) 10.22	-
AMT	0.31 (0.10) 3.07	1.57 (0.15) 10.22

PSI
Note: This matrix is diagonal

Structure	Strategy	MAP	Performance
0.96	0.82	1.49	43.51
(0.16)	(0.16)	(0.42)	(4.26)
6.09	5.11	3.54	10.22

Squared Multiple Correlations for Structural Equations:

Structure	Strategy	MAP	Performance
0.82	0.32	0.67	0.37

Reduced Form:

	Competition	AMT
Structure	0.31	0.18
	(0.04)	(0.05)
	6.98	3.72
Strategy	0.53	0.14
	(0.06)	(0.05)
	8.75	2.66
MAP	0.32	0.19
	(0.06)	(0.05)
	5.44	3.80
Performance	2.02	0.88
	(0.33)	(0.26)
	6.12	3.43

Squared Multiple Correlations for Reduced Form:

Structure	Strategy	MAP	Performance
0.19	0.32	0.18	0.11