The Impact of Changes in Environment and AMT on Management Accounting Practices and Organizational Strategy, Structure and Performance

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Abstract

This study investigates the impact of changes in business environment and manufacturing technology on organizational strategy, structure and management accounting practices, and the effect of these changes on the organizational performance of manufacturing companies in Malaysia

A quantitative research design was adopted and structural equation modelling was employed as the main statistical technique to test the hypothesized model.

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. Results also showed that neither market competition nor advanced manufacturing technology (AMT) influenced change in organizational structure.

This study also provides evidence of an interrelationship between management accounting practices and structure, but no evidence of a reciprocal relationship between management accounting practices and strategy.

Keywords

Management Accounting Practices
Advanced Manufacturing Technology
Competitive Environment
Strategy, Structure and Performance

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Introduction

This study examines the response of the manufacturing companies in Malaysia to the rapid changes in technological and competitive environment resulting from 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; Smith, Morris, & Ezzamel, 2005).

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.

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 (Tuan Mat & Smith, 2011; 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 consistency in an organization, indeed, strategy and structure have been identified in the previous literature as the most important factors in the management accounting change process.

To address the above concerns, this study investigates how the changes in organizational structure, strategy and management accounting practices have responded to changes in the business environment and manufacturing technology. This study also further investigates the effect of these changes on organizational performance.

Literature Review and Hypotheses Development

Management accounting and organizational change is a central issue within organizational, management and accounting theory. 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).

The reasons for management accounting to change are termed “motivational factors” (Laitinen, 2006) and a substantial list of motivational factors have been suggested (e.g., Baines & Langfield-Smith, 2003; Laitinen, 2001; Libby & Waterhouse, 1996). Innes and Mitchell (1990) found a different set of circumstances linked with management accounting change, which they termed as: motivators (e.g., competitive market, organizational structure, and product technology); catalysts (e.g., poor financial performance, loss of market share, organizational change); and facilitators (e.g., accounting staff resources, degree of autonomy, accounting requirements). Laitinen (2001) classified these factors into six groups: information needs; changes in technology and environment; willingness to change; resources for change; objectives for change; and external requirements. Laitinen (2006), later reduced these factors to just four categories to explain management accounting change: *organizational factors; financial factors; motivational factors; management tools.*

Management accounting research has used a variety of theoretical frameworks to explain the changes. Hopwood (1987, p. 207) claimed that ‘very little is known of the processes of accounting change’. Researchers have commended various theoretical frameworks to explain these accounting changes, e.g. Gordon and Miller (1976) on contingency theory to explain how changes in the environment surrounding an organization causes changes in organizational factors as well as its accounting practice and decision making process. This study uses contingency theory to explain the need for a good fit between the MAS, external

environment and organizational aspects, to improve performance. This is a similar approach to that adopted in other studies of management accounting and organizational change which also use contingency theory (e.g., Baines & Langfield-Smith, 2003; Haldma & Laats, 2002; Hyvönen, 2007).

Changes in Competitive Business Environment and Manufacturing Technology

In a changing environment, markets have become more competitive, mainly in respect of 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 and flexibility, as well as reducing cost. According to Shields (1997), competition, technologies, organizational design and strategies are the potential change drivers. These drivers of change also indicate the differing roles which causal factors can have in the process of change.

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, decentralized structures 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 in a decentralized organization.

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) demonstrate the indirect effect of competitive environment on organization structure.

According to Khandwalla (1974), adopting new technologies may require changes in organizational structures and work processes to better suit the capabilities of improved 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 structure that better fit the requirements of an unstable environment. Thus, for better success, there is a need for a change to organizational structure fostered by changes in competitive business environment and advanced technology applications. Thus, the following hypotheses are proposed:

***H_1**: Organizations facing a more competitive environment will change their structure.*

***H_2**: Organizations facing manufacturing technology advancement will change their structure.*

Changes in Competitive Environment, Technology and Organizational Strategy

The organization should change its strategy to accommodate the change in environment factors. 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). 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 a differentiation strategy that emphasizes more customer-oriented aspects such as quality, flexibility, innovative products and dependability of supply (Perera et al., 1997). Customer-focused strategies are of particular interest in this study and provide a form of product differentiation strategy (Hyvönen, 2007). 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).

Several empirical researches have also studied the linkage between competitive environment, advanced technology and strategy. For example, Tuan Mat and Smith (2011, 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. Tuan Mat and Smith (2011), provide evidence of influence of changes in competitive environment and AMT on strategy in Malaysian manufacturing companies. Fuschs, Mifflin, Miller and Whitney (2000) also 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 advanced manufacturing technology.

Therefore, the following hypotheses are proposed:

***H_3**: Organizations facing a more competitive environment will change towards a differentiation strategy.*

***H_4**: Organizations facing manufacturing technology advancement will change towards a differentiation strategy.*

Changes in Competitive Environment, Technology and Management Accounting Practices

Literature also suggests that changes in environmental factors surrounding an organization can have a significant impact on its management accounting systems (Tuan Mat and Smith, 2011; Tuan Mat, Smith and Djajadikerta, 2010; Baines & Langfield-Smith, 2003; Hoque & James, 2000; Innes & Mitchell, 1995; Smith et al., 2005; Waweru et al., 2004). For example Waweru et al. (2004) 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; Waweru et al., 2004).

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; Jarrar & Smith, 2014). 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).

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.

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 themselves 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.

This leads to the following hypotheses:

***H_5**: Organizations facing a more competitive environment will change their management accounting practices.*

***H_6**: Organizations adopting advanced manufacturing technology will change their management accounting practices.*

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.

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 structure 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 a decentralized 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, leading to the following hypotheses:

***H_7**: Changes in management accounting practices and organizational structure are reciprocal.*

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 number of empirical findings: for example, Baines and Langfield-Smith (2003) in their study of 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 of 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, Ng and Paul (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 hypothesis is proposed:

***H_8**: Changes in management accounting practices and organizational strategy are reciprocal.*

Impact on Performance

Hoque et al. (2001) suggest that in an 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.

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 performance through the use of management accounting information. Thus, the following hypothesis is proposed.

H_9: Increases in management accounting practices will result in improved organizational performance.

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:

H_{10}: *Changes in organization structure will result in improved organizational performance.*

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). Hoque (2004) 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. According to Chenhall and Langfield-Smith (2003), Hambrick (1980) views strategy as a pattern of important decision that guides the organization in its relationship with its environment and centrally affects the organization's 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. This leads to the final hypothesis:

H_{11}: *Changes to a differentiation strategy will result in improved organizational performance.*

Questionnaire Design and Variable Measurement

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 the conceptual model. The questionnaire was first pre-tested through peer evaluation to test respondents' understanding of the wording of the questions, the time taken to complete the questionnaire, and any difficulties in completing the questionnaire. Besides peer-evaluation, the questionnaire was also pre-tested on prospective respondents, which included potential users of the data (i.e., accounts/ finance managers in manufacturing firms in Malaysia).

The variables (except for organizational performance) used an 11-point Likert scale, 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. For analysis purpose scores were coded '0' for N/A and the remaining responses were coded 1–11. The point of 'no change' was coded as '6'.

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 range 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 include price competition; competition for new product development; marketing (or distribution channels) competition; competition for markets (or revenue) share; competitor's actions; and number of competitors in your market segments.

With respect to 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): 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; and numerical control.

The items for organization structure were adapted from the 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; and 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); and make rapid volume/product mix changes.

The items for management accounting practices 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 using the instrument developed by Sulaiman and Mitchell (2005). 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 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; and Shareholder value analysis / EVA.

Organizational performance was 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 and a single performance score was calculated as weighted average of all dimension, 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

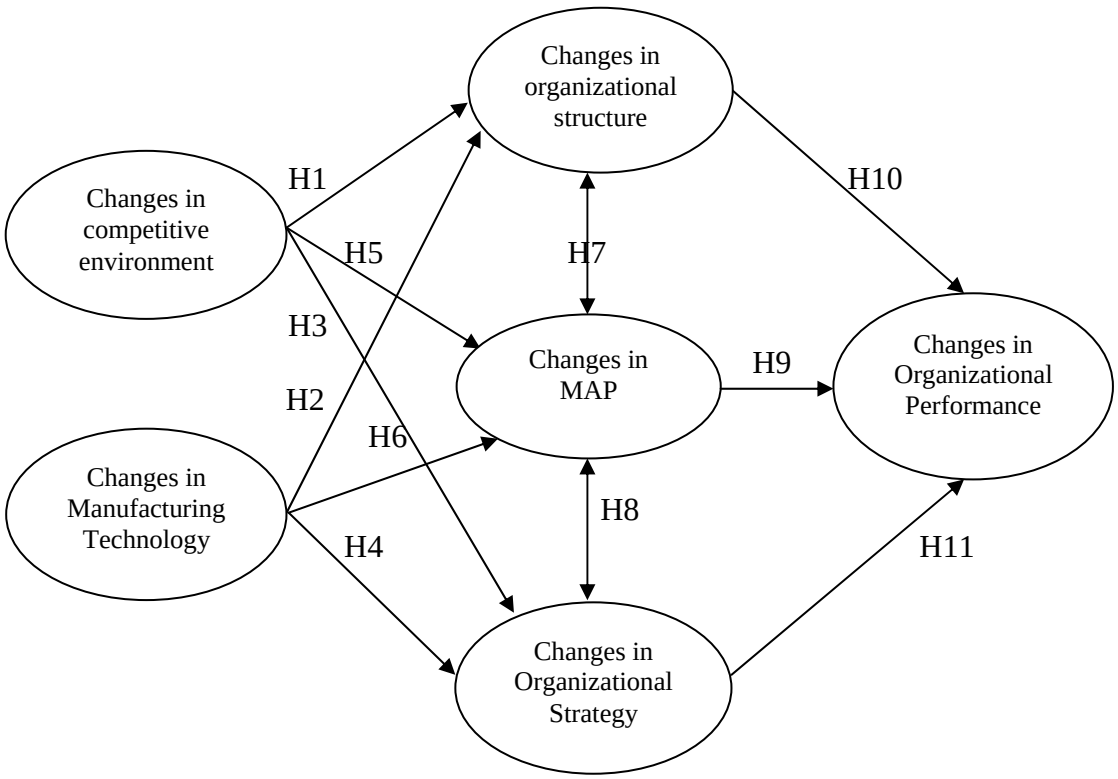
(R&D); Cost reduction programs/ cost control; Personnel development; Workplace relations; and Employee health and safety.

Sampling and Data Collection Procedures

The sample was drawn from manufacturing industry in Malaysia. 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 (Smith, Abdullah & Abdul-Razak, 2008). The list of manufacturing companies in Malaysia was taken from the Federation of Malaysian Manufacturers (FMM) Directory of Malaysian Industries 2008 (the latest edition at the time) and this directory was used as the sampling frame for the research. The sample of 1,000 manufacturing firms was randomly selected from two regions, i.e. Klang Valley and northern region (Penang). These regions were selected due to the fact that these are the two most industrialised areas in Malaysia (FMM, 2008; Smith et al., 2008).

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 Smith (2011, p. 124), 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.

Figure 1: Hypothesized Model



Data Analysis

Structural Equation Modelling (SEM) is used to test the hypothesized model developed in this study. SEM 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 (Smith & Langfield-Smith, 2004). The sample obtained is considered sufficient for statistical analysis and ultimately for accomplishing the objectives of the research.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 (Smith & Langfield-Smith, 2004).

Table 1: 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
Yacht 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**	

Table 2: Descriptive Statistics for Final Variables

Variable	Theoretical range	Actual range	Mean	Standard deviation	Cronbach's alpha	AVE
Change in competitive environment	1-11	6.31-11.00	9.09	1.13	0.81	0.50
Change in AMT	1-11	1.52-9.96	7.66	1.25	0.93	0.66
Change in Strategy	1-11	5.88-11.00	9.07	1.14	0.90	0.58
Change in structure	1-11	6.00-10.90	8.50	1.06	0.89	0.56
Change in MAP	1-11	5.72-10.21	8.30	1.11	0.92	0.58
Performance	1-55	13.21-54.58	33.81	8.32	0.93	0.70

This study uses a CBSEM approach and employs LISREL for Windows version 8.80 to analyse the data. Descriptive analysis using SPSS is also used as an exploratory data analysis tool before proceed with SEM.

Results

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. 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, the closest proxy that we have for non-response. Results for descriptive statistics show no significant differences between the two groups of respondents. It indicated that the samples are representative and respondents' error is not considered an issue in this research.

Profile of Responding Companies

A profile of the participating organizations is presented in Table 1. The sample in this study embraces small and large companies. Out of a sample of 212 companies only 12 percent were small companies. The balance comprises medium to large companies, with the majority (48 percent) large companies. Advanced manufacturing technology and management accounting practices are normally adopted by medium to large manufacturing companies in Malaysia (Sulaiman and Mitchell, 2005).

Measurement Model

Before proceeding with the SEM analysis, the exploratory data screening, and validity and reliability tests were conducted. This ensures that the data fulfilled the requirements for SEM analysis. SEM assumptions are similar to multiple linear regression analysis; the important assumptions are linearity, normal distribution of the variables and low multicollinearity. The test shows that all measures were statistically valid and reliable for further analysis. Hence, they were retained for structural model analysis. 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. Table 2 lists the descriptive statistics for each variable in the study.

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).

Table 2 showed the results of AVE and Cronbach's alpha for all constructs. All indicators loaded well (>0.5) and values of reliability measures and average variance extracts (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 3). 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

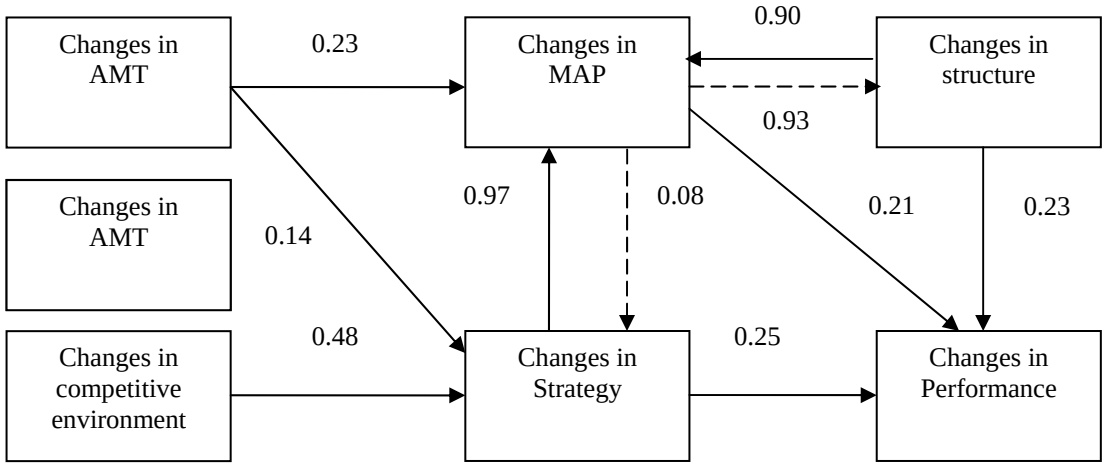
used to develop the structural model in SEM analysis.

The correlations among the hypothesized variables were studied in order to ensure that the relationships between them actually existed. From Table 3, 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 3: Correlation Matrix among the Constructs

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

Figure 2: The Final Model



Structural Model

The structural model was specified using path analysis, whereby 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.

The structural model was tested based on the hypotheses of the study. In this stage, relationships from one construct to another were assigned based on the proposed theoretical model using path analysis. The output for the hypothesized structural model showed a deviation from the fit model (X^2 = 67.84; df = 3; p = 0.0 ; RMSEA = 0.32; GFI = 0.90; CFI = 0.90; AGFI = 0.32; AIC = 103.84 (saturated model = 42)). Based on the goodness of fit (GOF) statistics, 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.

This re-modification resulted in a more appropriate model fit (see Figure 2). 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. Figure 2 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 (χ^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 for given theory.

GOF statistics show 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 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.

Hypotheses Testing and Discussion of Results

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 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 3.

Changes in Competition, AMT and Structure (H_1 and H_2)

From Table 3 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 1 and 2 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 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, they do support the findings of Baines and Langfield-

Smith (2003), who found no significant direct relationship between competitive environment and structure, or for AMT with structure. In their study, competitive environment appears to respond to the change in strategy which later results in changes in structure; meanwhile this study shows an indirect relationship between AMT and structure through changes in MAP. This result suggests that, 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 which in some way will change routine and work unit elements in an organization (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 employees to perform several tasks (Dibrell & Miller, 2002). Hence, a flatter organization structure is needed to complete this change process.

Table 4: Result of Hypotheses Testing

Hypotheses	Estimates Value	Standardized Value	T-Value	P-Value	Support/ Reject
H_1: Competition→Structure	0.09	0.10	1.44	0.143	Rejected
H_2: AMT→Structure	0.07	0.08	1.24	0.170	Rejected
H_3: Competition→Strategy	0.50	0.48	7.04	0.001**	Supported
H_4: AMT→Strategy	0.13	0.14	2.25	0.043*	Supported
H_5: Competition→MAP	0.06	0.06	0.78	0.259	Rejected
H_6: AMT→MAP	0.20	0.23	2.47	0.034*	Supported
H_7: Structure→MAP MAP→Structure	1.04 0.98	0.90 0.93	3.88 8.09	0.009** 0.001**	Supported Supported
H_8: Strategy→MAP MAP→Strategy	1.22 0.09	0.97 0.08	7.95 0.64	0.001** 0.467	Supported Rejected
H_9: MAP→Performance	1.54	0.21	2.61	0.030*	Supported
H_{10}: Structure→Performance	1.81	0.63	3.00	0.020*	Supported
H_{11}: Strategy→Performance	1.83	0.25	2.91	0.022*	Supported
Significant level at ** $P < 0.01$; *$P < 0.05$ (one-tailed)					

Changes in Competition, AMT and Strategy ($H_3$and H_4)

The second group of Hypotheses ($H_3$and H_4) 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.

These 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 impact changes in structure, different findings are obtained for strategy. These hypotheses support many other studies in this area (for example, Baines & Langfield-Smith, 2003; DeLisi, 1990; Fuschs et al., 2000; Schroeder & Congden, 2000), demonstrating that strategy is an important variable in the study of organizations.

It has also been suggested that organizations facing a more competitive environment and increased 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; 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 Australian manufacturing companies confirm 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 require 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.

Changes in Competition, AMT and MAP (H_5 and H_6)

While Hypothesis 6, 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 5 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.

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 a different way. Results show that increases in competitive environment do not cause changes in MAP in Malaysian manufacturing companies.

This outcome 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 still largely use 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 that of Ma and Tayles (2009). The new management accounting techniques would be adopted if they met the needs of senior management, and could not be implemented 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 (e.g., 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 a 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).

Changes in MAP, Structure and Strategy (H_7 and H_8)

It was posited that there is an interrelationship among changes in MAP with changes in organizational structure and strategy. Hypothesis 7 is strongly supported at a significance level of $P<0.01$, however the relationship between changes in MAP and changes in strategy was not interrelated, resulting in the rejection of Hypothesis 8. Results show that changes in strategy caused changes in MAP but changes in MAP do not cause changes in strategy. These results show evidence that there is an interrelationship between changes in MAP and changes in organizational structure, but not between changes in MAP and strategy.

Hypotheses 7 proposed an interrelationship between organizational structures and MAP. Much literature (e.g., Gerdin, 2005; Luther & Longden, 2001) has supported this relationship without testing for its existence. The results in this study have filled this gap, and show a significant interrelationship between MAP and structure. It is confirmed that a change in the form of flatter organizational structures has caused changes in MAP, and that increased change in MAP also causes structural change.

Formal change occurs through the introduction of new MAP in organizations. For example MAP such as ABC can 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 a restructuring process. Haldma and Laats (2002) showed how organizational structure influenced MAP to change, while 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.

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, 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, a view 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 has 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 (i.e., Kloot, 1997; Kober et al., 2007; Perera et al., 2003).

5.5 Impact of Management Accounting and Organizational Change on Performance (H_9-H_{11})

Hypotheses 9 to 11 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 their performance in a positive direction.

As depicted in Figure 3, 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 improvement in performance among

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, 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 demonstrated that an alignment among competitive environment, AMT, MAP, structure and strategy has a positive impact on organizational performance.

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.

Conclusions

The overall picture emerging from this study is based on the theoretical framework developed from Western studies, and applied to a Malaysian manufacturing environment. Focusing on the alignment among competitive environment, AMT, MAP, structure and strategy, this study addressed empirically the research question by testing for causal relationships between these measures and their impacts on organizational performance.

This study has supported numerous conclusions from the existing literature regarding increases in competitive environment and AMT causing changes in internal organizational factors. 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. In 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 allow business operations to become more successful and help managers to manage resources more effectively.

The structural model also shows a significant link among strategy, MAP and structure, leads

to an increase in performance. As 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 a decline in performance. While external environment factors drive firms to place more emphasis on their 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, because the use of effective MAP can assist employees in focusing more easily on achieving differentiation priorities, which could help in maintaining and improving customer expectations. 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 the authority and responsibility for making decisions, at low levels in an organization. Changing to a flatter structure will result in an increased 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.

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 limited sample size, any generalization of the study's results to non-manufacturing organizations or beyond cannot be made without caution. In addition, each of the variables examined in this study comprise several indicators which were reduced to constructs, thus limiting 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 from providing more information on strategic behaviour in the studied organizations. The advanced manufacturing technology and management accounting practices reported in this study may include the technology and methods that do not practiced by the responded companies, especially the small companies, as the responses were mainly based on their perception. 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. Despite these limitations, the results have extended our understanding of management accounting and organizational change in Malaysian manufacturing companies.

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Appendix: Questionnaire Survey

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.*

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 systems (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)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

SECTION C

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	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

b)

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	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
f) Customize products & services to customer needs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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	☐	☐	☐	☐	☐	☐	☐

SECTION E

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"