

## **CHAPTER THREE**

### **THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT**

#### **3.0 Introduction**

This chapter presents the theoretical framework and develops the hypotheses that are used in this study. It starts with a discussion on the contingency theory that is used as the basis of the study. Then, the theoretical framework of the research is presented, followed by the development of the research hypotheses.

#### **3.1 Contingency Theory**

According to Otley (1980), the concept of contingency was first developed in the organisation theory literature in the early to mid-1960's, however, its application in the accounting research was insignificant before the mid-1970's. Contingency theory states that efficient organisation structures vary with organisational contextual factors such as technology and environment. It further implies that the effectiveness of certain managerial techniques is contingent on the organisation's context and structure (Lawrence and Lorsch, 1967; Waterhouse and Tiessen, 1978; 1983). In the context of management accounting, contingency theory is based on the premise that there is no universally appropriate accounting system that applies equally to all organisations in all circumstances (Otley, 1980). Factors such as technology and the environment are

among the contextual factors that could explain why accounting systems have been found to differ from one organisation to another. These contextual factors will affect the organisation's structure, which will then influence the design of an accounting information system.

Haldma and Laats (2002) reclassify these contextual factors into external and internal factors. They argued that the effectiveness of the design of an accounting system depends on its ability to adapt to changes in external and internal circumstances. In management research, the main external factors that have been investigated are external environment (Khandwalla, 1972; Hambrick, 1981; Gordon and Narayanan, 1984; Swamidass and Newell, 1987; Anderson and Lanen, 1999; Saudagaran and Diga, 1999; Mia and Clarke, 1999; Chong and Rundus, 2004; Agbejule and Burrowes, 2007; Patiar and Mia, 2008; Ax et al., 2008), and national culture (Hofstede, 1984; O'Connor, 1995; Tsui, 2001; Henri, 2006). The internal contextual factors that have been investigated are technology (Chenhall and Morris, 1986; Mia and Chenhall, 1994; Kalagnanam and Lindsay, 1999), structure (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Brownell, 1985; Lee and Yang, 2010), organisational size (Hendricks and Sigal, 2001; Martinez-Lorente et al., 2004), and company strategies (Miles and Snow, 1978; Porter, 1980; Miller and Friesen, 1982; Gupta and Govindarajan, 1984; Simons, 1987; Frey and Gordon, 1999; Jermias and Gani, 2004; Boulianne, 2007; Cadez and Guilding, 2008).

The review of the literature on contingency theory shows that this theory originated from theorists such as Burns and Stalker (1961), Thompson (1967), Lawrence and Lorsch (1967), Perrow (1970), and Galbraith (1973). The early works on this theory examined the impact of the environment and technology on organisational structure. Since then, the contingency theory has been applied and widely used in management

and accounting research. More recently, the impact of new contextual factors such as contemporary technology and strategy are examined. Chenhall (2003; 2007) provided a comprehensive review of the application of contingency theory in management control research. To further understand this theory, the effects of each contextual factor, which consist of the external environment, technology, structure, culture, size, and strategies, are discussed.

### **3.1.1 The External Environment**

The earliest contextual factor that has been examined in the contingency-based research is the impact of the external environment (Burns and Stalker, 1961; Galbraith, 1973; Lawrence and Lorsch, 1967; and Perrow, 1970). The external environment is also considered as a powerful contextual factor and forms a base in contingency studies (Chenhall, 2003; 2007). The two most commonly researched factors of the external environment are market competition and PEU. The work of Khandwalla (1972), which was discussed earlier in the previous chapter, is among the earliest empirical studies examining the impact of the external environment. Specifically, he examined the effects of different types of competition (price, product, and distribution) on the use of controls by manufacturing firms.

Hambrick (1981) examined the relationship of the environment and strategy on the power of top management teams. In order to represent the environment of different industries, survey data from 195 chief executives from three distinct industries (private general hospitals, life insurance firms, and private colleges) were gathered. The findings suggest that different industry environments affect the relationship between functional

areas and the power of top management teams. For example, insurance firms that faced an environmental requirement for product/market innovation, involvement in the marketing and product development functions had a positive relationship with power. In contrast, hospitals that faced an external requirement for efficiency and cost control, the accounting/finance, process improvement and operations functions were positively related to power. Colleges did not face any dominant environmental requirement, thus, the relationship between functional areas and the power of top management teams was muted and mixed.

Gordon and Narayanan (1984) investigated the impact of contextual variables on the design and perceived usefulness of MAS in organisations. Contextual variables used in this study are PEU and organisation structure. Using a cross-sectional study from 34 profit-oriented, medium-size, Midwestern domiciled firms in the major cities of the states of Kansas and Missouri, they examined the relationships between an organisation's PEU, its structure and its information system. They found that a higher PEU is associated with organic types of organisational structure, and with higher perceived importance attached to information characterised as being external, non-financial and ex-ante. In contrast, a lower PEU is associated with mechanistic types of organisational structure, with lower perceived importance attached to external, non-financial and ex-ante information. In other words, when greater environmental uncertainty is perceived, decision makers tend to seek for external, non-financial and ex-ante information in addition to other types of information and increasingly move towards an organic form of organisation. The results of the study indicate that the environment is an important factor in designing accounting systems. Characteristics of information that are useful will depend on the type of environment. Managers facing high environmental uncertainty use more information for decision making.

Based on the data from 35 manufacturing firms in Seattle, Swamidass and Newell (1987) found that PEU influenced manufacturing strategy, which, in turn, influenced business performance. This study measured manufacturing strategy in terms of flexibility and the role of manufacturing managers in strategic decision making. More recently, Agbejule and Burrowes (2007) studied the relationship between PEU, supplier development, and the use of MAS information in manufacturing firms in Finland. The responses from 78 managers confirmed that PEU is a determinant of supplier development, which, in turn, influences the use of broad scope MAS. Their finding is consistent with Gordon and Narayanan's (1984) study.

Anderson and Lanen (1999) explored the evolution of management accounting practices in 14 Indian firms in 1996. They studied the contingent relationship between external competition and management accounting practices and explored the potentially mediating effects of firms' competitive strategies. They found that changes in the external environment prompt changes in organisational strategy and structure, which support the contingency theory. The changes in management accounting practices (planning and control, performance measurement, and cost management) also depend on whether firms adopted 'defender' or 'prospector' strategies and whether they were domestic or international.

In financial accounting, Saudagaran and Diga (1999) used the contingency approach in comparative international accounting. They postulated that financial accounting systems are related, on a contingent basis, to particular environmental variables, namely, political, economic and socio-cultural.

Recently, Abdel-Kader and Luther (2008) empirically examined ten contingency factors that influence management accounting sophistication of the UK's food and drink industry. Consistent with previous studies (e.g.: Gordon & Narayanan, 1984 and Chenhall & Morris, 1986), the survey results suggest that PEU significantly explained the differences in management accounting sophistication. Firms that perceive a higher degree of environmental uncertainty adopt more sophisticated management accounting practices than firms that perceive lower environmental uncertainty.

The contingent effect of market competition has been thoroughly discussed in Chapter 2. For example, Mia and Clarke (1999) and Hoque (2011) found that the intensity of market competition influences firms to use MAS information. Patiar and Mia (2008) showed that market competition has a negative impact on firms' financial performance. The increasing competition faced by organisations also influences them to adopt certain practices. Chong and Rundus (2004), and Ax et al. (2008) revealed that competition does influence firms to adopt TQM and target costing.

### **3.1.2 Technology**

Several definitions of technology exist in prior literature. As noted by Waterhouse and Tiessen (1978), Woodward (1965) defines technology in terms of the physical flow of production. However, Waterhouse and Tiessen (1978) define technology as the routineness or non-routineness of the raw materials' conversion processes. Chenhall (2003; 2007) defines technology as including the hardware, software, materials, people, and knowledge that are involved in the organisation's work processes. He further categorises technology into two types: generic and contemporary. Generic technology

includes complexity, interdependence and task uncertainty, while contemporary technology refers to advanced technology.

Complexity refers to standardisation of work. Highly specialised, non-standard, and differentiated products represent increasing levels of complexity, which require complex unit and batch technologies. In contrast, standard and undifferentiated products that require mass production and process technologies represent decreasing levels of complexity.

Interdependence means the extent to which it has to depend on others in completing a task or process. There are three types of interdependence: pooled, sequential, and reciprocal. Being the lowest form, pooled interdependence depends less on others, while sequential interdependence is dependent upon the workflow of others. If the first unit does not complete the task, then the second unit cannot proceed with its work. Reciprocal interdependence is the highest form of interdependence, where the work flows back and forth between units. Chenhall and Morris (1986) found that organisational interdependence is associated with broad scope, aggregated and integrated information. Thus, managers must consider the level of interdependence before designing MAS.

Task uncertainty refers to the variability in the tasks and the analysability of methods in performing the tasks. Mia and Chenhall (1994) demonstrated that different departments face different levels of task uncertainty. They found that marketing departments, which face more uncertainty, tend to use broad scope MAS more than production departments, which involves more certain tasks.

In today's competitive environment, the manufacturing processes become more complex, which requires more sophisticated and advanced technologies. Contemporary technologies such as JIT, TQM, and flexible manufacturing (FM) have become the new contextual factors of technology (Chenhall, 2003; 2007). Kalagnanam and Lindsay (1999) utilised both case study and survey methods to study the use of organic models of control in JIT manufacturing firms in Canada. The results from the three case studies and 155 survey responses indicate that JIT firms move towards an organic rather than a mechanistic form of management control system. The firms used more informal and cross-functional communications, decentralised decision making, participation and teamwork integration. The authors provided three reasons for the adoption of organic control by JIT firms. First, the increase in the degree of coupling among processes due to the decreased time in task variability, and second, the nature of JIT system, which is more flexible in terms of production mix. In order to fulfil customer demands, minimise costs, ensure higher quality products and on time delivery, production flexibility requires integration and coordination among various parties. Lastly, JIT philosophy, which focuses on continuous improvement through the elimination of waste, needs cooperation from all workers.

Using JIT, TQM and AMT as contextual variables, Abdel-Kader and Luther (2008) showed that these firms adopt more sophisticated management accounting practices. Thus, in line with the advancement in technology and as suggested by Chenhall (2003; 2007), JIT, TQM and AMT are regarded as new contextual factors that could explain organisational behaviour.



### **3.1.3 Structure**

Similar to technology, various definitions exist for organisational structure. Burns and Stalker (1961) define structure in terms of mechanistic and organic types. Mechanistic types of organisational structure involve reliance on formal rules, procedures and routines, whereas organic types, involve fewer rules and procedures, and tend to be more flexible. As discussed in the previous section, Gordon and Narayanan (1984) found that lower (higher) PEU is associated with mechanistic (organic) types of organisational structure. Kalagnanam and Lindsay (1999) discovered that JIT firms tend to use an organic form of control rather than mechanistic due to their nature of system. These two studies show that the discussion of organisational structure in contingency-based research is normally related with other contextual factors, such as the environment or technology.

In addition, a recent study by Lee and Yang (2010), which investigates the effect of organisation structure and competition on the design of performance measurement systems of Taiwanese firms, demonstrated that organisational structure is significant and positively related to the design of performance measurement systems. The survey data from 168 firms listed on the Taiwan Stock Exchange showed that organic organisations rely more on integrated performance measures and higher developmental stages of performance measurement systems compared to mechanistic organisations. However, no such support was found for the effect of competition on the design of performance measurement systems. They also found that the positive effect of the use of integrated measures on organisational performance is stronger in mechanistic organisations than in organic organisations due to the characteristics of the mechanistic

structure, which involves highly specified or formalised procedures and the centralisation of decision making.

Organisational structure is also defined as the way in which organisations are differentiated (Lawrence and Lorsch, 1967). Decentralisation is a mechanism of differentiation. As discussed previously in Chapter 2, Chenhall and Morris (1986) revealed that decentralisation is associated with aggregated and integrated MAS information. Mia and Chenhall (1994) concluded that functional differentiation also has an impact on the use of broad scope information in improving the performance of managers. The greater task uncertainties faced by marketing departments influence the use of more MAS information compared to production departments to enhance managers' performance. In budgeting, Brownell (1985) investigated functional differentiation between research and development (R&D) and marketing departments on budget participation. Based on the data from questionnaires and unstructured interviews, he concluded that budget participation is more effective in R&D than in marketing departments. Budget participation in R&D departments was found to have a greater positive relationship with managerial performance than its counterparts.

Abdel-Kader and Luther (2008) also classified decentralisation as a type of firm structure. This organisational characteristic was found to affect the level of adoption of certain management accounting practices. Decentralised firms adopt more sophisticated management accounting practices than centralised firms. This result suggests that decentralised firms require more sophisticated management accounting practices to assist them in planning, controlling and decision making.

### 3.1.4 Size

Size refers to how big an organisation or a plant is. Size is usually measured by the number of employees (Mia and Chenhall, 1994; Martinez-Lorente et al., 2004; Isa, 2005; Boulianne, 2007; Mia and Winata, 2008, Dal Pont et al., 2008), sales turnover or revenues (Martinez-Lorente et al., 2004; Boulianne, 2007) and total assets (Abdel-Kader and Luther, 2008). Similar to structure, size has been studied together with other dimensions of context such as technology and structure. In operations management contingency research, the effect of size has been investigated in order to examine the applicability of certain practices in smaller firms. For example, Martinez-Lorente et al. (2004) also showed that the implementation of TQM and IT are affected by company size. Larger firms are found to have a higher implementation level on both TQM and IT than smaller firms. Hendricks and Singhal (2001) asserted that firm size moderates the benefit of TQM implementation. However, they showed that smaller firms benefit more from TQM as compared to larger firms, even though both types of firm showed a positive relationship with profitability.

In management accounting and control research, Mia and Chenhall (1994) used large manufacturing firms as an indicator for formal financial control systems. They believe that large firms tend to adopt more formal control systems due to their size. Agbejule and Burrowes (2007) also chose medium to large sized firms due to the higher likelihood of adopting MAS and manufacturing strategies. Similarly, Abdel-Kader and Luther (2008) found that large firms adopt more sophisticated management accounting practices compared to small firms. The possible explanation could be because larger firms have financial capabilities and resources to adopt more advanced techniques and practices.

### **3.1.5 Strategy**

Even though strategy is not a part of contextual factors as contended by Chenhall (2003; 2007), numerous studies have considered strategy as an important element of organisational effectiveness. This could be due to the importance of strategy to achieve competitive advantage and, subsequently, enhance organisational performance. Each organisation is unique and, therefore, different organisations may adopt different strategies that are best suited to their own objectives, environment, structure, and culture.

As discussed in detail in Chapter 2, there are different taxonomies that explain different types of business strategies. Miles and Snow (1978), for example, differentiate strategy into prospectors, analysers, defenders and reactors; Porter (1980) classifies business strategy into product differentiation, cost leadership and focus group; Miller and Friesen (1982) categorise business strategy into entrepreneurial and conservative; and Gupta and Govindarajan (1984) group the strategies into build, hold, harvest and divest. Among these taxonomies of strategies, the two most frequently used taxonomies in business and management research are Miles and Snow's (1978), and Porter's (1980) typology of strategies. However, as asserted by Abdel-Kader and Luther (2008, p. 8), "these taxonomies are not significantly different and can be reconciled with prospectors/builders/product differentiators at one end of a continuum and defenders/harvesters/cost-leaders at the other end".

Hambrick (1981) considers strategy as a critical contingency for organisations. He examined the contingent effect of strategy on the relationship between functional areas and top management power in three distinct industries. His findings indicate that in defender colleges, involvement in the marketing and product/service development was negatively related to the power of top management teams, while in prospector colleges, it was not related to power. A similar finding was also found in hospitals and no support for the relationship between marketing and product/service development and top management power was found in the insurance firms. The findings imply that top management power is affected by strategies adopted by organisations. The same functional area also affected top management power differently, depending on the strategy and industry to which it belongs. Therefore, the effectiveness of organisational strategy in particular functional areas depends on the type of industry in which it operates.

Simons (1987) investigated the relationship between business strategy and accounting control systems in 108 Canadian manufacturing firms from 28 industries. The findings suggest that firms following different strategies employed different accounting control systems. Consistent with the theory, prospector firms place less emphasis on cost control and high performing prospector firms place greater emphasis on forecast data in control systems, setting tight budget goals, and monitoring outputs. Large prospector firms also focus on frequent reporting and the use of uniform control systems while large defender firms seem to use their control systems less intensively. Negative relationships were also observed between performance and control attributes such as tight budget goals and output monitoring for defender firms. These findings support

contingency theory that accounting control systems should be designed specifically to suit the business strategy of the firm.

Frey and Gordon (1999) employed Porter's (1980) classification of strategy to examine whether the performance of Activity Based Costing (ABC) practices are contingent upon the competitive strategy employed by a business unit. Responses from 123 senior financial officers indicate that ABC is associated with higher returns on investment (ROI) in business units following a differentiation strategy but not in those following a cost leadership strategy. As such, the benefits derived from ABC implementation are contingent on the competitive strategies employed by a business unit.

Using the fitness landscape approach, Jermias and Gani (2004) developed and measured the contingent fit between strategic priorities and its contextual variables and investigated the association between the level of contingent fit and effectiveness at business unit levels. Based on personal interviews and a mail survey of 106 general managers, controllers and management accountants of companies listed on the Jakarta Stock Exchange under the consumer goods industry, they found that product differentiation companies put more emphasis on behavioural, and use more management accounting systems that enhance companies' ability to differentiate their products and to satisfy their customers (MAS type I). However, low cost strategies emphasise output more, and use more management accounting systems that enhance companies' ability to control costs (MAS type II). They also found support for a contingent fit between strategy and contextual variables, which, in turn, positively affect business unit effectiveness. Boulianne (2007) also found that the fit between strategic choice and the use of AIS could improve business unit performance. The study showed that the use of broad scope AIS by prospector and defender firms led to enhanced

performance.

Cadez and Guilding (2008) used an integrated contingency model to examine the effect of four contingency factors (business strategy, deliberate strategy formulation, market orientation, and company size) on strategic management accounting (SMA) of 193 large Slovenian companies. The study found that SMA usage is positively associated with three of the four contingency factors (adoption of a prospector strategy, deliberate strategy formulation, and company size), and accountants' strategic decision making participation, which, in turn, positively affects performance. The results support the contingency theory's premise that organisational performance depends on the fit between the organisational context and structure and that there is no universally appropriate SMA system. Factors such as strategy and company size have a significant impact on the successful application of SMA.

### **3.1.6 Culture**

Different countries and different organisations have different cultural characteristics. Thus, culture can be grouped either as national or organisational culture. As contingency theory postulates that there is no universally appropriate accounting system that applies equally to all organisations in all circumstances, different cultural values may influence the choice of accounting system in organisations. In the operations management field, the influence of culture is usually examined because most of its best practices, such as JIT and TQM, originated from one country, Japan. Therefore, there is a need to examine the effectiveness of these practices in different countries and cultures (Sousa and Voss, 2008).

Hofstede (1984, p. 389) defines culture as “the collective programming of the mind which distinguishes the members of one category of people from those of another”. He further characterises culture into four categories: power distance, individualism, masculinity, and uncertainty avoidance.

Although inequality is common in every society, the acceptance varies between societies. Power distance considers a situation where the less powerful person in a society accepts inequality in power as a norm. Individualism protects their own interests and that of their immediate family more than others. Conversely, collectivism considers that every member of a society belongs to one or more groups that cannot be detached. Each group will protect its members’ interests and is tightly integrated.

Masculinity differentiates social roles for men and women. Men are expected to be assertive, ambitious, and competitive, to strive for material success, and to be respected. Whereas women are expected to serve and care for the nonmaterial quality of life, for children, and for the weak. In contrast, femininity does not differentiate social roles between sexes. Both men and women may choose a different quality of life than material success, interpersonal relationships and concern for the weak.

Uncertainty avoidance prefers to avoid uncertainty (unstructured, unclear, or unpredictable situation), and, thus, relies on rules and structures. Strong uncertainty avoidance cultures are active, aggressive, emotional, security seeking, and intolerant. Cultures with weak uncertainty avoidance are contemplative, less aggressive, unemotional, accepting of personal risk, and relatively tolerant.



Contingency-based research often used these cultural characteristics. For instance, O'Connor (1995) examined whether the differences in organisational culture between Singapore and foreign manufacturing firms affect the usefulness of budgetary participation in a high power distance nation such as Singapore. The findings from the interviews and survey of 125 responses from 44 manufacturing firms reveal that power distance moderates the usefulness of participation in budget setting and performance evaluation at the organisational culture level in decreasing role ambiguity and improving superior/subordinate relationship. The relationships between role ambiguity and superior/subordinate relationships as well as budget participation and performance evaluation were found to be stronger in foreign firms than local Singapore entities.

Tsui (2001) postulates that the relationship between MAS and budgetary participation on managerial performance is different depending on the cultural background of the managers. For Chinese managers, with a large-power distance, high-collectivist, and long-term orientation society, the positive relationship between MAS and managerial performance decreases as budgetary participation increases. For Western managers, low levels of budgetary participation are associated with a negative relationship between managerial performance and MAS, however, this relationship becomes positive at high levels of budgetary participation. These results were based on the questionnaire survey of 51 Chinese subunit managers in Chinese manufacturing firms in Xian, China and 38 Caucasian expatriate subunit managers in manufacturing firms in Hong Kong.

Henri (2006) defines organisational culture in terms of two attributes: control and flexibility. He examined the relationship between organisational culture and performance measurement systems. The survey data from 383 Canadian manufacturing firms suggests that top managers of flexibility value firms tend to use performance

measurement systems to focus organisational attention, support strategic decision making and legitimise actions to a greater extent than top managers of control value firms. Flexibility value firms also used more performance measures in terms of a broad set of financial and non-financial measures than control value firms. Thus, organisational culture does have an impact on management control systems of an organisation as measured by performance measurement systems.

### **3.2 Theoretical Framework and Hypotheses Development**

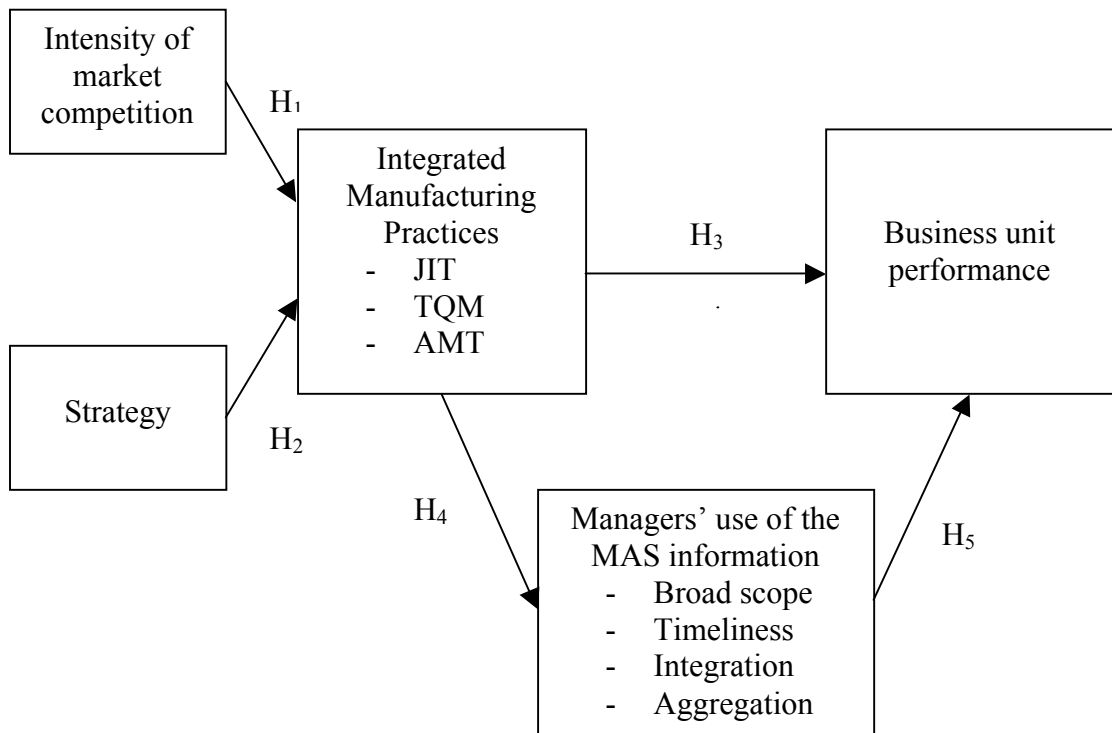
According to Otley (1980), the contingency approach to management accounting is based on the premise that there is no universally appropriate accounting system that applies equally to all organisations in all circumstances. Therefore, it is suggested that particular features of an appropriate accounting system will depend upon the specific circumstances of an organisation. Thus, the contingency theory suggests that to improve performance there should be a matching between contingent factors faced by the organisation and control systems employed by the organisation. The type of control systems must be suitable in the environment within which the organisation operates. The effectiveness of the design of an accounting system depends on its ability to adapt to changes in external circumstances and internal factors.

Contingency theory states that efficient organisation structures vary with organisational contextual factors such as technology and the environment. It is further implied that the efficacy of certain managerial techniques is contingent on the organisation's context and structure. As the competition level escalates and strategies adopted change due to changes in the business environment, manufacturing firms need to employ advanced

manufacturing techniques to survive and prosper. Thus, the implementation of integrated manufacturing practices (IMP) such as JIT, TQM and AMT may be influenced by the contextual factors of an organisation. In this study, the level of competition in the market and strategies adopted by manufacturing firms are predicted to influence the adoption of integrated manufacturing practices. It is expected that the implementation of these practices would affect the way managers' use MAS information. In an advanced manufacturing environment, managers need to make faster strategic decisions, which would require more broadly based, timely, integrated and aggregated information in order to achieve the targeted performance. Thus, it is argued that through the use of appropriate MAS information, firms will be able to achieve improved performance. In other words, the use of MAS information mediates the relationship between IMP and performance.

The contingency-based approach assumes that MAS are adopted in order to assist managers in achieving some desired company outcomes or goals. The ultimate outcome of all organisations is to achieve the highest performance level as possible. To materialise this, each organisation would set its own performance targets based on the resources available and its capabilities. As such, the contingency theory is relevant in discussing the effects of the intensity of market competition and strategy on integrated manufacturing practices implementation, MAS and performance. Thus, this study's research framework is developed based on the contingency theory framework.

Figure 3.1 shows the research framework of this study. The nature of the external environment and internal factors such as the intensity of market competition and strategy, respectively, influence the firms to adopt integrated manufacturing practices. It is also proposed that the implementation of integrated manufacturing practices influences managers' use of MAS information to improve performance. As asserted by Haldma and Laats (2002), contingency-based research postulates the existing link between context, the use of the MAS and, consequently, improved performance.



**Figure 3.1: Theoretical Framework of the Research**

### **3.2.1 Market Competition and Integrated Manufacturing Practices**

Market competition causes turbulence, stress, risk and uncertainty to organisations (Mia and Clarke, 1999). In an advanced manufacturing environment, intensifying market competition results in increased product range, decreased product life cycles and changes in manufacturing technology. In such an environment, organisations must adopt and implement appropriate practices in order to adapt quickly to the needs of the market and to remain competitive. For manufacturing companies, one way to survive the competition is by providing quality products at the lowest possible costs, which could be achieved through an appropriate manufacturing strategy. Organisations may also adopt multiple practices to deal with a high level of market competition. One such practice is integrated manufacturing, which can help the manufacturing companies to compete in a highly competitive environment. Even though additional costs will be incurred by these companies to adopt these practices, the expected benefits from the implementation of these integrated manufacturing practices may outweigh their costs. Russell and Taylor III (1995) also highlighted four distinctive competences that an organisation should pursue in order to compete in the marketplace. The distinctive competences are cost, quality, flexibility and speed. Competing on cost means the elimination of all waste, which is similar to JIT philosophy. Competing on quality refers to an opportunity to please the customer, which is the objective of TQM. Competing on flexibility means a variety of choices to be offered to the customer, which is one of the criteria of AMT. Finally, competing on speed refers to a reduction in the time required for the product to enter the market. This time-based competition is crucial in integrated manufacturing practices, especially in AMT.

It is also important to note that different types of competition may have a different impact on manufacturing practices. For example, Khandwalla (1972) showed that price, distributive and product competition have a different impact on the usage of management controls. Similarly, the type and degree of competition faced by companies may influence the type of practice adopted. For instance, Das et al. (2000) found that international competition influenced the quality practices adopted by manufacturing firms. Chong and Rundus (2004) suggested that firms that face a high level of competition should adopt TQM. Ax et al. (2008) also revealed a link between competition and the adoption of target costing. Thus, it is predicted that the higher the degree of market competition faced by the companies, the higher the level of adoption of integrated manufacturing practices. The following hypotheses are proposed:

*H1: There is a positive relationship between the intensity of market competition and the use of integrated manufacturing practices.*

*H1a: There is a positive relationship between the intensity of market competition and JIT implementation.*

*H1b: There is a positive relationship between the intensity of market competition and TQM implementation.*

*H1c: There is a positive relationship between the intensity of market competition and AMT implementation*

### **3.2.2 Strategy and Integrated Manufacturing Practices**

Several studies have found that manufacturing strategy influences the choice of manufacturing practices, or vice versa. For example, Swamidass and Newell (1987) argued that JIT is suitable with strategies emphasising cost, quality, and flexibility. Jaikumar (1986) indicated that AMT is not fully utilised if it is not implemented in a strategy that focuses on increased flexibility. Similarly, Parthasarthy and Sethi (1992) argued that the capabilities of AMT are best suited to strategies that emphasise flexibility, and will not be fully utilised when implemented as part of a low-cost strategy. Dean and Snell (1996) found that TQM is positively related with quality, delivery and scope flexibility strategies, while AMT is negatively related with quality strategy. They also found that none of the integrated manufacturing practices are significantly related to low cost strategies. Similarly, business strategy may also influence the selection of manufacturing practices. However, the research examining the influence of business strategy on the adoption of manufacturing practices is very scarce. Thus far, only a few published studies have examined the relationship between business strategy and the adoption of certain manufacturing practices. For instance, Dansky and Brannon (1996) found that prospector and analyser were related to TQM. Prajogo and Sohal (2006) revealed that differentiation strategy is positively and significantly related to TQM. Similarly, due to diverse information processing needs of a differentiation strategy, Kotha and Swamidass (2000) showed that differentiation strategy is positively associated with the usage of several dimensions of AMT. Therefore, the implementation of IMP should be considered in view of an organisation's business strategy. It is expected that the business strategy adopted by manufacturing firms is related to the use of manufacturing practices. Specifically, similar to Dansky and Brannon (1996), this

study also postulates that prospector strategy is related to the use of IMP due to its characteristic of consistently looking for product and market opportunities and its ability to work in flexible and uncertain environments. As IMP is normally associated with flexibilities and the objective implementation of IMP is to gain competitive advantage, it is expected that the prospector strategy is more likely to be applied in organisations adopting IMP.

*H2: There is a positive relationship between the prospector strategy and the use of integrated manufacturing practices.*

### **3.2.3 Integrated Manufacturing Practices and Performance**

Firms adopt advanced manufacturing practices such as integrated manufacturing practices as part of the strategies to improve performance. Each of the manufacturing practices has its own potential in improving performance. JIT, for example, may improve performance by eliminating waste and reducing inventory handling costs while TQM assists firms to improve performance by continually focusing on quality. AMT may improve performance due to its ability to produce products in large quantities with speedier manufacturing processes. However, past studies examining the relationship between these manufacturing practices and performance showed mixed results. For example, Fullerton et al. (2003) found that only JIT manufacturing practices has a positive relationship with performance in a cross sectional study, however, in a longitudinal study, JIT quality and JIT unique practices outperform JIT manufacturing practices. In contrast, Balakrishnan et al. (1996) found that the performance of the JIT firms fell significantly less compared to the non-JIT firms after three years of JIT



adoption. Similarly, Jaikumar (1986), and Kotha and Swamidass (2000) showed that AMT is related to performance, however, Dean and Snell (1996) found otherwise. The study of Hendricks and Singhal (1997), and Kaynak (2003) showed that TQM positively affects performance. Dean and Snell (1996) also found that only TQM has a positive direct relationship with performance, while integrated manufacturing practices are not significantly related to performance. In view of the mixed findings, there is a need to examine the relationship between the level of integrated manufacturing practices and performance. It is expected that each dimension of integrated manufacturing practices such as JIT, TQM and AMT has a positive impact on both financial and non-financial performance. Consequently, the joint implementation of these practices will also positively affect performance. The following hypotheses ensue:

*H3: There is a positive relationship between integrated manufacturing practices and performance.*

*H3a: There is a positive relationship between JIT implementation and performance.*

*H3a1: There is a positive relationship between JIT implementation and financial performance.*

*H3a2: There is a positive relationship between JIT implementation and non-financial performance.*

*H3b: There is a positive relationship between TQM implementation and performance.*

*H3b1: There is a positive relationship between TQM implementation and financial performance.*

*H3b2: There is a positive relationship between TQM implementation and non-financial performance.*

*H3c: There is a positive relationship between AMT implementation and performance.*

*H3c1: There is a positive relationship between AMT implementation and financial performance.*

*H3c2: There is a positive relationship between AMT implementation and non-financial performance.*

#### **3.2.4 Integrated Manufacturing Practices and MAS Information**

The inconclusive results for the direct relationship between these manufacturing practices and performance could be due to several reasons. One of the possible explanations is that managers' use of information provided by MAS may mediate this relationship. The broad scope MAS provides information on financial and non-financial, quantitative and qualitative, internal and external, and historical and future oriented data. Timeliness concerns the speed and frequency of reporting, while integration deals with the interaction between subunits within the same organisation. Aggregation focuses on aggregated information around functional areas, time periods or

responsibility centres, provision of unprocessed data, and information used for decision models and analysis.

Mia and Clarke (1999) addressed the gap that the managerial use of MAS should be examined in other circumstances including the application and evaluation of new manufacturing technology such as CAD/CAM and JIT manufacturing systems. The use of the information provided by the MAS may assist managers to adopt and implement manufacturing practices more efficiently and effectively. The application of new manufacturing technology is expected to change the way managers use MAS information. Broad scope MAS, timeliness, integration and aggregation are expected to be useful to managers in advanced manufacturing environments. Chenhall (2003; 2007) proposed that TQM is associated with broadly based MCS including timely and externally focused information. He also proposed that the advanced technologies of JIT and FMS are associated with broadly based MCS. Recently, Mia and Winata (2008) found that JIT is positively associated with the use of broad scope information. However, to date, research examining the use of MAS in advanced manufacturing environments such as JIT, TQM and AMT is still lacking. Thus far, no published study has investigated the use of MAS in the AMT and integrated manufacturing environment. Hence, the current study attempts to fill the gap by testing the following hypotheses:

*H4: There is a positive relationship between integrated manufacturing practices and managers' use of MAS information.*

*H4a: There is a positive relationship between integrated manufacturing practices and managers' use of broad scope MAS information.*

*H4b: There is a positive relationship between integrated manufacturing practices and timeliness of MAS information.*

*H4c: There is a positive relationship between integrated manufacturing practices and managers' use of integrated MAS information.*

*H4d: There is a positive relationship between integrated manufacturing practices and managers' use of aggregated MAS information.*

### **3.2.5 MAS Information and Performance**

The use of MAS information by managers can assist them in making more accurate decisions, which will lead to improvement in performance (Mia, 1993). Chenhall and Morris (1995) show that an improvement in organisational performance could be achieved when MAS is extensively used. Sim and Killough (1998) suggest that the performance of firms adopting JIT or TQM is higher if they use information provided by MAS. Mia (2000) also found that higher performance is achieved by JIT firms that have greater MAS information compared to non-JIT firms. In higher market competition, Mia and Clarke (1999) and Hoque (2011) portray that the use of MAS information has resulted in improved performance. Similarly, Patiar and Mia (2008) indicate that the interaction effect of market competition and the use of MAS information enhances the non-financial performance of hotels. Realising the usefulness of MAS information, the current study also postulates the positive relationship between managerial use of MAS and performance. Hence, the following hypotheses follow:

*H5: There is a positive relationship between managers' use of MAS information and performance.*

*H5a: There is a positive relationship between broad scope MAS and performance.*

*H5b: There is a positive relationship between timeliness and performance.*

*H5c: There is a positive relationship between integration and performance.*

*H5d: There is a positive relationship between aggregation and performance.*

### **3.2.6 Integrated Manufacturing Practices, MAS Information and Performance**

Hypotheses four and five postulate that managerial use of MAS information plays a mediating role in the relationship between the integrated manufacturing practices and performance. A mediating or an intervening relationship exists when the relationship between independent and dependent variables exists, at least, partly, through a third variable. In such a case, the third variable plays the mediating role in the relationship between the other two variables (Mia, 1993; Mia and Clarke, 1999). Therefore, if hypotheses four and five are supported, then, the managerial use of the information provided by the MAS plays a mediating role in the relationship between integrated manufacturing practices and performance (see Figure 3.1).

Table 3.1 summarises the relationship between research objectives, research questions and hypotheses used in the study.

**Table 3.1: Summary of Research Objectives, Research Questions and Hypotheses**

Research Objectives	Research Questions	Hypotheses
<p>1) To examine the relationship between intensity of market competition and the use of integrated manufacturing practices.</p>	<p>1) Is there any relationship between the intensity of market competition and the use of integrated manufacturing practices?</p>	<p>H1: There is a positive relationship between the intensity of market competition and the use of integrated manufacturing practices.</p> <p>H1a: There is a positive relationship between the intensity of market competition and JIT implementation.</p> <p>H1b: There is a positive relationship between the intensity of market competition and TQM implementation.</p> <p>H1c: There is a positive relationship between the intensity of market competition and AMT implementation.</p>
<p>2) To examine the relationship between strategy and the use of integrated manufacturing practices.</p>	<p>2) Is there any relationship between strategy and the use of integrated manufacturing practices?</p>	<p>H2: There is a positive relationship between the prospector strategy and the use of integrated manufacturing practices.</p>
<p>3) To examine the relationship between integrated manufacturing practices and business unit performance.</p>	<p>3) Is there any relationship between integrated manufacturing practices and business unit performance?</p>	<p>H3: There is a positive relationship between integrated manufacturing practices and performance.</p>

**Table 3.1: Summary of Research Objectives, Research Questions and Hypotheses  
(continued)**

Research Objectives	Research Questions	Hypotheses
		<p>H3a: There is a positive relationship between JIT implementation and performance.</p> <p>H3a1: There is a positive relationship between JIT implementation and financial performance.</p> <p>H3a2: There is a positive relationship between JIT implementation and non-financial performance.</p> <p>H3b: There is a positive relationship between TQM implementation and performance.</p> <p>H3b1: There is a positive relationship between TQM implementation and financial performance.</p> <p>H3b2: There is a positive relationship between TQM implementation and non-financial performance.</p> <p>H3c: There is a positive relationship between AMT implementation and performance.</p> <p>H3c1: There is a positive relationship between AMT implementation and financial performance.</p> <p>H3c2: There is a positive relationship between AMT implementation and non-financial performance.</p>

**Table 3.1: Summary of Research Objectives, Research Questions and Hypotheses  
(continued)**

Research Objectives	Research Questions	Hypotheses
4) To examine the relationship between integrated manufacturing practices and MAS.	4) Is there any relationship between integrated manufacturing practices and MAS?	<p>H4: There is a positive relationship between integrated manufacturing practices and managers' use of MAS information.</p> <p>H4a: There is a positive relationship between integrated manufacturing practices and managers' use of broad scope MAS information.</p> <p>H4b: There is a positive relationship between integrated manufacturing practices and timeliness of MAS information.</p> <p>H4c: There is a positive relationship between integrated manufacturing practices and managers' use of integrated MAS information.</p> <p>H4d: There is a positive relationship between integrated manufacturing practices and managers' use of aggregated MAS information.</p>
5) To examine the relationship between MAS and business unit performance.	5) Is there any relationship between MAS and business unit performance?	<p>H5: There is a positive relationship between managers' use of MAS information and performance.</p> <p>H5a: There is a positive relationship between broad scope MAS and performance.</p>



**Table 3.1: Summary of Research Objectives, Research Questions and Hypotheses  
(continued)**

Research Objectives	Research Questions	Hypotheses
		<p>H5b: There is a positive relationship between timeliness and performance.</p> <p>H5c: There is a positive relationship between integration and performance.</p> <p>H5d: There is a positive relationship between aggregation and performance.</p>
<p>6) To examine whether MAS mediates the relationship between integrated manufacturing practices and business unit performance.</p>	<p>6) Does MAS mediate the relationship between integrated manufacturing practices and business unit performance?</p>	

### 3.3 Chapter Summary

This chapter starts with an introduction, followed by a thorough discussion of the theory relevant to the study, contingency theory, in section 3.1, and theoretical framework and development of research hypotheses in section 3.2.