CHAPTER FOUR

RESEARCH METHODOLOGY

4.0   Introduction

In this chapter, the research methodology adopted for the study will be discussed. The aspects that are going to be discussed in this chapter are research design, sample selection and the data collection methods, which comprise questionnaire survey and semi structured interviews, measurement of variables and data analysis techniques.

4.1   Research Design

This study utilised a mixed method approach as the research design, which combines two types of data collection methods: questionnaire survey and semi-structured interview. The questionnaire survey represents a quantitative data collection method, whereas the semi-structured interviews represent a qualitative data collection method. Even though multi-methods of data collection are costly and time consuming, high correlations of these data lend more confidence in the goodness of the data (Cavana, Delahaye and Sekaran, 2001; Sekaran, 2003), more credibility to the research instrument and rigour to the research (Sekaran, 2003). As Sekaran (2003, p. 256) asserted, "Good research entails collection of data from multiple sources and through multiple data collection methods". Kober et al. (2007) also agreed that the mix of quantitative and qualitative methods could provide a systematic and comprehensive

analysis of the interrelationship between variables within a rich and more meaningful context. The inclusion of qualitative method such as interview could also facilitate in determining the reliability of the survey responses and providing more insights into the survey results (e.g.: Isa, 2005; 2007; Abdel-Kader and Luther, 2008). More recently, Modell (2010) and Vaivio and Sirén (2010) recognised that the use of the mixed method in management accounting research not only enable the researcher to combine breadth and depth in empirical studies, enhance the validity of research findings, and facilitate the mobilisation of multiple theories, but could also bridge the gap between the mainstream and alternative paradigm. As such, this study adopted a combination of both quantitative and qualitative data collection method. Thorough discussions on these methods are discussed in Section 4.2 and Section 4.3 below.

4.2   Questionnaire Survey

The first phase of data collection is gathered through a questionnaire survey. The questionnaire survey technique serves as the main data collection tool for this study. It is the most suitable data collection method for this study because it deals with primary data. Furthermore, a questionnaire survey could reach a large number of targeted respondents in various geographical locations.

4.2.1 Sample Selection and Respondents to the Questionnaire Survey

As this study aims to examine the relationship among integrated manufacturing practices, MAS and performance among manufacturing firms in Malaysia, the population of interest is all manufacturing firms operating in Malaysia. The manufacturing sector was chosen because AMT is mainly applicable for manufacturing firms. The sample of firms was selected from manufacturing firms listed in the Federation of Malaysian Manufacturers (FMM) Directory year 2009. There were over 2000 firms registered as members of FMM from various sectors and located throughout Malaysia. The sample for the questionnaire survey consisted of 1000 manufacturing firms randomly selected from the FMM Directory. Adoption of IMP is not a prerequisite for the sample firms since Abdul Rahman (2008) found that AMT in Malaysia is applicable to all firms and industries. Similar to Abdul Rahman (2008), this study also included all manufacturing firms regardless of size and industry. Thus, the sample used in this study covered various industries and was geographically dispersed.

The most appropriate unit of analysis for the study is the business unit. The definition of business unit is adopted from Mia and Clarke (1999, p. 142), who define business unit as either an organisation, or a segment of an organisation, which has its own business activities such as marketing, production, finance, personnel, customer service and R&D. Similarly, Youssef and Al-Ahmady (2002) define business unit as either an entire organisation, division, or a plant. Other studies that used business unit as the unit of analysis include Jermias and Gani (2004), Boulianne (2007), and Mia and Winata (2008). The rationale of using business unit analysis rather than organisational analysis is to obtain a wider sampling frame. Furthermore, different business units may adopt

different strategies and face different types of competition. Govindarajan (1988) also recognised that different business units within the same organisation often adopt different strategies. Thus, this study looked at the data gathered from each business unit.

The questionnaire together with a cover letter explaining the purpose of the survey as well as promising confidentiality of the information provided were sent either to the General Manager, Financial Controller, Production Manager, Factory Manager, Operation Manager or other top managers. These targeted respondents were chosen due to their involvement in strategy implementation, their broad knowledge of the competition faced by the company, their experience in IMP implementation, their use of MAS as well as their responsibility for company performance.

4.2.2 Administration of the Questionnaire Survey

Questionnaires were either distributed through electronic mail (e-mail) or postal mail to respondents. For postal mail questionnaires, a reply-paid self-addressed envelope was enclosed with the questionnaire to enable the respondents to return the questionnaire. In addition, the company address given in the FMM Directory was rechecked against the company website or any sites available on the Internet. This was done to ensure that the address is valid. The questionnaires were only sent to the manufacturing firms that have the same address both in the FMM Directory and website.

A mail survey is considered appropriate for the study since the samples are located throughout Malaysia. Thus, it will save cost, both in time and money. Furthermore, the degree of anonymity is high and the respondents can complete the questionnaire at their

own convenience (Cavana et al., 2001), which can increase the reliability of the answers provided.

Follow-up calls were made to selective respondents in order to ensure that the respondents received the questionnaires and had responded. The questionnaires were pre-coded to enable the non-respondents to be traced in order to do follow-up.

A total of 1000 sets of questionnaires and cover letters were mailed out (either by e-mail or postal mail) starting in September 2009. The respondents were given a duration of one month to reply. Several steps were taken to obtain a higher response rate. These included: (1) promising confidentiality of information provided, (2) enclosing a reply-paid self-addressed envelope, (3) reminders and follow-up calls, (4) enclosing contact details if they had any inquiries, (5) resending a second set of questionnaires for the non-responses, (6) pre-coded questionnaires, (7) using only closed-ended questions, and (8) a token of appreciation for every completed questionnaire returned.

Reminders and follow-ups were made through e-mail or telephone calls in October 2009. However, due to the low response rate, second sets of questionnaires were sent to the selected respondents in November 2009. Out of 1,000 set of questionnaires mailed out, 22 sets were returned for various reasons: (1) the company no longer existed, (2) change of address, (3) closure of postal box or locked bag, and (4) the selected respondents refused to participate in the survey. The first three reasons indicate that neither the FMM Directory nor the company website had updated the current contact details, thus, the information provided was not reliable. Finally, a total of 118 responses were received, representing a response rate of 11.8%. A detailed analysis of the response rate will be discussed in the next chapter.

Respondents were categorised into two main categories: early respondents (those responding within one month) and late respondents (those who responded after one month). A non-response bias test was carried out on these two groups. Only those passing this test were preceded to further statistical analysis. The data was processed using Statistical Package for Social Science (SPSS) version 17.0 software and Smart Partial Least Square (SmartPLS) version 2.0 software.

4.2.3   Questionnaire Design

The questionnaire was designed to elicit responses from the respondents on their perceptions towards market competition, their business strategy, implementation of IMP in their firms, the use of MAS, and business unit performance. The questions used to measure their perceptions were adopted from previous empirical studies with slight modification. Only closed-ended questions with either categorical or a five-point Likert scale were used in the survey. The rationale for only using closed-ended questions is because they could help the respondents to make quick decisions to choose from among the several alternatives given (Cavana et al., 2001), which could increase the response rate. Closed-ended questions are also easy to administer because they can be easily coded for subsequent data analysis (Cavana et al., 2001).

To ensure the validity and reliability of the data collection, the questionnaire was subjected to a preliminary check by academic scholars for its clarity, applicability and content validity. In addition, pilot tests were also conducted among the selected practitioners to obtain their feedback regarding the clarity of the questions. In this study,

five pre-test questionnaires were given to academic scholars, especially in management accounting and research methodology areas, and the other five questionnaires were given to practitioners involved in the manufacturing sector. These persons were selected because of their expertise in the field and because they represent the actual sample. Subsequent discussions were held with each of them to improve the construct validity of the questionnaire. Accordingly, modifications to the wording and content of the questionnaire were made based on the suggestions and comments from both academicians and practitioners. These pre-test questionnaires were not included in the data analysis.

At the beginning of the questionnaire, a cover page stating the title, the objective of the survey, confidentiality assurance, deadline, and researcher's contact details was presented. The questionnaire consisted of nine major sections. Each section has a different set of questions that relates to its category. Section A and B consisted of questions regarding two contextual factors used in this study, intensity of market competition and strategy, respectively. Section C, D, E comprised questions related to each element of integrated manufacturing practices: AMT, TQM and JIT, respectively. Section F asked questions relating to MAS information, while Section G asked respondents to provide their perception on business unit performance based on the performance indicators given. Section H concerned the demographic information such as background information of the respondents and companies. The demographic information can be asked either at the beginning or at the end of the questionnaire. This study prefers to put it at the end of the questionnaire to help reduce respondent bias due to the sensitivity of that information for certain people (Cavana et al., 2001). The respondents were also asked to provide their contact details in the final section, Section I for future correspondence and follow-up. A token of appreciation was given to the

respondents who returned the completed questionnaire and provided their contact details.

In Sections A through H, the questions were either categorical or interval Likert scale. A five-point Likert scale was used in the questionnaires to denote frequency of occurrence or agreement, where 1 denotes an infrequent occurrence or disagreement and 5 for frequent occurrence or agreement. The questions were adapted from previous empirical studies with a slight modification if necessary. A copy of the cover letter and the questionnaire are attached in Appendix A.

4.2.4   The Measurement of Variables

The variables of the study consist of the intensity of market competition, strategy, integrated manufacturing practices (JIT, TQM and AMT), MAS and performance. Intensity of market competition and strategy were treated as antecedent variables, integrated manufacturing practices as independent variables, managers' use of MAS as intervening variable, and performance as the dependent variable. These variables or concepts were further operationalised into observable and measurable dimensions and elements.

4.2.4.1   Intensity of Market Competition

The current study adopted Mia and Clarke's (1999) instrument to measure the intensity of market competition. Similar to their study, the degree or intensity of market

competition was measured in terms of multiple factors including the three types of competition used in Khandwalla's (1972, 1973) study. Khandwalla (1972, 1973) only measured the competition in terms of price, product and distribution. However, there are other factors as well that may trigger the market competition, which were identified by Mia and Clarke (1999). Following Mia and Clarke (1999), eight factors were used to measure market competition: number of competitors operating in the market, frequency of technological change in the industry, frequency of new product introduction, extent of price manipulation, package deals for customers offered by competitors, access to marketing channels, changes in government regulations or policy, and overall competition. These factors may affect competition either in isolation or in combination. Porter (1979) suggests that the collective strength of different factors (the threat of new entrants, the bargaining power of customers, the bargaining power of suppliers, the threat of substitute products or services, and rivalry among competitors) affect the intensity level of competition of an industry. Day and Wensley (1988) also suggested that a comprehensive diagnosis to assess the competitive advantage can only be gained with a combination of methods. Thus, a combination of several factors is the most appropriate way to examine the competition faced by organisations.

It is important to note that the purpose of overall competition (item 8) is merely to serve as a control item in order to examine the consistencies in the responses provided for the other seven items. Thus, it is not included in the determination of the overall mean for market competition.

This study used a Likert scale as employed by Khandwalla (1972, 1973) and Mia and Clarke (1999) to measure the level of competition faced by organisations. However, in contrast with their studies, this study utilised a five-point scale rather than a seven-point

scale. Dawes (2008) found that data from five- and seven-point scales produced the same mean score and showed very similar characteristics in terms of measures of dispersion and shape after a simple transformation was applied. Therefore, for standardisation and simplification, a five-point scale was used. The scale ranging from "low" to "high".

Table 4.1: Measures for Market Competition

		1	2	3	4	5
1.	Number of major competitors					
2.	Frequency of technological change in the industry					
3.	Frequency of new product introduction					
4.	Extent of price manipulations/exploitations					
5.	Package deals for customers					
6.	Access to marketing channels					
7.	Changes in government regulation or policy, such as tariff reductions					
8.	Overall competition based on all factors above (1-7)					

Scale: 1 (Low) to 5 (High)

4.2.4.2   Strategy

This study utilised Miles and Snow's (1978) typology of strategy, namely, prospector, defender, analyser, and reactor. Miles and Snow's (1978) typology is used for several reasons: (1) its widespread use in the literature on strategy (Dansky and Brannon, 1996; Naranjo-Gil and Hartmann, 2007; Kober et al., 2007; Boulianne, 2007; Cadez and Guilding, 2008; among others), (2) its applicability across various types of organisations and industries (e.g.: insurance firms, hospitals and colleges (Hambrick, 1981); manufacturing firms (Simons, 1987; 1988)), (3) it has quite similar attributes to other types of strategy such as product differentiation and low cost strategies (Porter, 1980), entrepreneurial and conservative strategies (Miller and Friesen, 1982) and build and harvest strategies (Gupta and Govindarajan, 1984), (4) it is academically well accepted

and internally consistent, and (5) it has been empirically tested in several studies (Snow and Hrebiniak, 1980; Hambrick, 1981; Hambrick, 1983; Slocum et al., 1985; Simons, 1987, 1988, 1990). Shortell and Zajac (1990) conducted a longitudinal study in two periods (1984-85 and 1986-87) by using both perceptual and archival data from 574 hospitals to assess the validity and reliability of Miles and Snow's (1978) strategic measures. Overall, the results support predictions across a variety of measures. Thus, the Miles and Snow's (1978) strategic types are found to be valid and reliable.

This study used the instrument developed by Parnell (1997) to measure the strategy. In addition to four types of strategy introduced by Miles and Snow (1978), Parnell (1997) added another strategy archetype: the balancer. Similar to Parnell (1997), this study also adopted five types of strategy: prospector, defender, analyser, balancer, and reactor. Furthermore, this study also employed a multi-item approach in categorising the strategy archetypes. The multi-item approach was also used by Smith, Guthrie and Chen (1986), Segev (1987), Conant, Mokwa and Varadarajan (1990) and Dansky and Brannon (1996). Conant et al. (1990) outlines several advantages of the multi-item approach over the paragraph approach: (1) ability to capture the broader concept and comprehensiveness of strategy archetypes, (2) easily administered, (3) possesses diagnostic value for both strategists and the organisation, (4) improvement in content validity, (5) provides a higher level of discriminatory power and lower levels of measurement error (Venkatraman and Grant, 1986), and (6) increases both reliability and validity assessment (Peter, 1979).

There were 12 main questions with five statements representing different types of strategy. The classifications of prospector, defender, analyser, balancer, and reactor, which were represented by each statement, were not stated in the questionnaire to avoid

bias in categorising the actual strategy implemented by the organisation. Respondents were required to state their degree of agreement or disagreement for each statement based on a five-point Likert scale ranging from "strongly disagree" to "strongly agree". Parnell (1997) used a nominal scale rather than an interval Likert scale to classify the strategy. This study prefers to use the interval Likert scale because metric measurement scales (such as interval scales and ratio scales) provide the highest level of measurement precision (Hair, Anderson, Tatham and Black, 1998) and allow almost all arithmetical operations (such as means and standard deviations) to be performed. Moreover, organisations may have a combination of strategies. In this case, the respondents would agree on more than one statement in each question. Instead of using a categorical scale that limits their responses, an interval Likert scale permits them to state their level of agreement or disagreement for each statement, which is suited to the organisation. The interval Likert type scale was also used by Smith et al. (1986), Segev (1987) and Dansky and Brannon (1996) in measuring strategy. Consequently, similar to Segev (1987), an average score across the 12 items was used to measure the strategy implemented by each organisation.

Table 4.2: Measures for Strategy

		1	2	3	4	5
1.	**Considering our products and services, we:**					
a)	primarily seek to provide the highest quality products and services possible.					
b)	primarily seek to provide our products and services at the lowest possible price.					
c)	primarily seek to differentiate our products and services from those of our competitors.					
d)	tend to emphasise one or more factors such as quality, price or uniqueness for a while, and later emphasise other factors.					
e)	primarily seek to provide products and services most consistently with consumer demands.					
2.	**In the future, we plan to position our company in the marketplace as:**					
a)	one that does the best job in meeting consumer demands.					
b)	one that does whatever generates the greatest return at that time.					
c)	one that responds quickly to change.					
d)	one that satisfies the demands of a particular group of consumers exceptionally well.					
e)	one that leads the way in new products and services.					
3.	**If asked about our company, most current and prospective customers would:**					
a)	consider us to be an efficient producer of goods and services.					
b)	consider us to be highly innovative.					
c)	feel as if we understand them well as consumers.					
d)	stress our ability to do many things well.					
e)	identify us with no particular area of distinctive competence.					
4.	**How does your company view change in the marketplace or your external environment?**					
a)	We usually try to initiate change.					
b)	We see change as continuous.					
c)	We do not think much about change.					
d)	We usually try to adapt to change.					
e)	We usually try to resist change.					
5.	**Most current and prospective customers probably:**					
a)	see our products and services as among the lowest priced available.					
b)	see our products and services to be the most in-tune with customer demands.					
c)	see a very high value in our products and services.					
d)	consider our products and services to be among the most unique.					
e)	see different attributes in our products and services.					

Scale: 1 (Strongly disagree) to 5 (Strongly agree)

Table 4.2: Measures for Strategy (continued)

		1	2	3	4	5
6.	**Relative to our competition, we:**					
a)	generate more than our share of new products and services.					
b)	develop and provide products and services to the market at a fast pace.					
c)	do some things well for a while, and then concentrate on other areas.					
d)	are the most competent marketers in the industry.					
e)	provide products and services primarily to a well-defined consumer group.					
7.	**In the future, we primarily plan to:**					
a)	do lots of things, nothing in particular.					
b)	focus on high innovation.					
c)	learn more about our customers.					
d)	improve our efficiency.					
e)	improve our ability to meet changes in the environment quickly and effectively.					
8.	**Current and prospective customers probably:**					
a)	see us as adapting well to the changes in the market.					
b)	are unclear about the way we modify our products and services over time.					
c)	view our products and services as stable and traditional.					
d)	appreciate our constant efforts to modify and update our products and services.					
e)	see us as a leader in the industry.					
9.	**One of our goals for the future is to offer products and services that:**					
a)	are easily differentiated from those of our competitors.					
b)	contribute to profits, regardless of what we sell.					
c)	are similar to those of our competitors, but at a lower cost.					
d)	meet specific consumer demands.					
e)	maximise quality and value for consumer.					
10.	**If you were to ask our present and potential customers, most would say:**					
a)	different things about our organisation.					
b)	that we market our products exceptionally well.					
c)	that we are often the first to modify existing products and services and develop new ones.					
d)	that we respond to the needs of our customers very quickly and effectively.					
e)	that we dominate one segment of the market, but are weak in most others.					
11.	**Our company concentrates most on:**					
a)	being flexible.					
b)	different areas that constantly change.					
c)	high efficiency.					
d)	innovation.					
e)	understanding our customers.					

Scale: 1 (Strongly disagree) to 5 (Strongly agree)

Table 4.2: Measures for Strategy (continued)

		1	2	3	4	5
12.	**We plan to:**					
a)	remain steadfast and consistent, regardless of changes and trends in the marketplace.					
b)	modify our products and services as necessary in order to meet changes in the marketplace.					
c)	redefine our industry.					
d)	make major changes to our strategy as dictated by the marketplace and our competitors.					
e)	maintain our strategic focus, but continuously make incremental changes in our strategy to address changes in the marketplace.					

Scale: 1 (Strongly disagree) to 5 (Strongly agree)

4.2.4.3 Integrated Manufacturing Practices

The measurement for integrated manufacturing practices was adopted from Snell and Dean (1992). The same measurement was utilised in the study of Dean and Snell (1991), Snell and Dean (1994), Sim and Killough (1998) and Abdel-Kader and Luther (2008). However, Sim and Killough's (1998) study only used two out of three integrated manufacturing practices' measurements developed by Snell and Dean (1992), JIT and TQM with slight modification. In addition, this study also adopted five items from Koc and Bozdag (2009) to measure AMT. The rationale for adding the measurement for AMT is to take into account the most advanced or latest technologies in AMT.

There were three components of integrated manufacturing practices, which consisted of JIT, TQM and AMT. Each of these components has its own variables. JIT comprised a 10-item scale measuring the extent to which an organisation attempts to minimise costs through reduced inventories and lead times. The variables which fall under JIT

classification were: attention devoted to minimising set-up times, performance of preventative maintenance, accounting system reflects costs of manufacturing, number of suppliers, size of deliveries, length of product runs, number of total parts, amount of buffer stock, products pulled through the plant, and plant laid out by process or product.

Table 4.3: Measures for JIT Manufacturing

		1	2	3	4	5
1.	Attention devoted to minimising set-up times					
2.	Performance of preventive maintenance					
3.	Accounting system reflects costs of manufacturing					
4.	Products pulled through the plant					
5.	Plant laid out by process or product					

Scale: 1 (Not used at all) to 5 (Extensively used)

Table 4.4: Measures for JIT Inventory

		1	2	3	4	5
6.	Number of your suppliers					
7.	Size of their deliveries					
8.	Length of product runs					
9.	Number of total parts					
10.	Amount of buffer stock					

Scale: 1 (Huge decrease) to 5 (Hugh increase)

TQM consisted of a 10-item scale measuring the extent to which an organisation uses techniques to ensure continuous improvement in order to fulfil customer needs. The items were: plant management devoted to quality improvement, working with suppliers to improve quality, ability to measure cost of quality, current approach to providing quality products, manufacturing processes under statistical control, employees have quality as a major responsibility, employees are given feedback about quality, quality function deployment, Taguchi methods, and continuous process improvements.

Table 4.5: Measures for TQM

		1	2	3	4	5
1.	How much time does the plant management staff devote to quality improvement? (1 = very little <----------------------------> 5 = a great deal)					
2.	How much time is spent working with suppliers to improve their quality? (1 = very little <----------------------------> 5 = a great deal)					
3.	How well are you able to measure the 'cost of quality' in your plant? (1 = not at all <----------------------------> 5 = precisely)					
4.	How would you describe your current approach to providing quality products? (1 = building it in <---------------------> 5 = inspecting it in)					

5.   What percentage (%) of the plant's manufacturing processes are under statistical control?

6.   What percentage (%) of the plant's employees has quality as a major responsibility?

7.   What percentage (%) of the plant's employees is routinely given feedback about quality?

		1	2	3	4	5
8.	Quality function deployment					
9.	Taguchi methods (statistical methods developed to improve the quality of manufactured goods)					
10.	Continuous process improvements					

Scale: 1 (Little or none) to 5 (Consistent use)

AMT comprised a 23-item scale measuring the extent to which an organisation implements and integrates computer technologies in its manufacturing processes. Out of 23 items, 18 items were adopted from Snell and Dean (1992) and the remaining 5 items were adopted from Koc and Bozdag (2009). The items that were adopted from Dean and Snell (1991) were: manufacturing resource planning (MRPII), computer-aided design (CAD), numerical control (NC), computer numerical control (CNC), direct numerical control (DNC), flexible manufacturing systems (FMS), robotics, automated materials handling, computer-aided test and inspection, computer-aided process planning, product design-product planning, product planning-component manufacturing, component manufacturing-assembly, assembly-production scheduling, production scheduling-maintenance, maintenance-materials handling, materials handling-quality control, and quality control-materials management. The items that were adopted from Koc and Bozdag (2009) were: computer-aided manufacturing (CAM), automated packaging, automated storage, local area network (LAN), and wide area network (WAN).

Table 4.6: Measures for AMT (Advanced Technologies)

		N/A	1	2	3	4	5
1.	Manufacturing resource planning (MRP II)						
2.	Computer aided design (CAD)						
3.	Computer aided manufacturing (CAM)						
4.	Numerical control (NC)						
5.	Computer numerical control (CNC)						
6.	Direct numerical control (DNC)						
7.	Flexible manufacturing systems (FMS)						
8.	Robotics						
9.	Automated materials handling						
10.	Automated packaging						
11.	Automated storage						
12.	Computer aided test and inspection						
13.	Computer aided process planning						
14.	Local area network (LAN)						
15.	Wide area network (WAN)						

Scale: N/A (If the technology is not applicable), 1 (Not used at all) to 5 (Extensively used)

Table 4.7: Measures for AMT (Computer Integration)

		N/A	1	2	3	4	5
16.	Product design development and production planning						
17.	Production planning and component manufacturing						
18.	Component manufacturing and assembly						
19.	Assembly and production scheduling						
20.	Production scheduling and maintenance						
21.	Maintenance and materials handling						
22.	Materials handling and quality control						
23.	Quality control and materials management						

Scale: N/A (Not applicable), 1 (Not computer integrated at all) to 5 (Completely computer integrated)

A slight modification was made in the measurement scale used in the current study. In Snell and Dean's (1992) study, AMT items were measured using a five-point Likert scale whereas JIT and TQM items were measured using a seven-point Likert scale. In Koc and Bozdag's (2009), AMT availability was measured using a dichotomous score, where 0 denotes an "absence" and 1 denotes an "existence". In order to standardise the measurement scale of all items, only a five-point Likert scale was used in the current study.

The measures for JIT can be segregated into two parts. The first part can be termed as JIT manufacturing (production) systems and the second part as JIT inventory (purchasing) systems. The JIT variables used in Dean and Snell (1991), and Snell and Dean (1992, 1994) after the factor analysis was conducted consisted of only five items that are related to JIT inventory systems. It is expected that this classification may be different in Malaysian manufacturing firms and due to time factor. Therefore, this study used all 10 items initially categorised as JIT variables by Snell and Dean (1992).

The level of implementation of JIT manufacturing systems was measured on a scale of 1 (Not used at all) to 5 (Extensively used), whereas the level of implementation of JIT inventory systems was measured on a scale of 1 (Huge decrease) to 5 (Huge increase). It has to be noted that measures for items related to JIT inventory systems were reverse coded. Therefore, for the purpose of data analysis, the score for these items need to be reversed in order to be in the same direction with other items. For example, a response on a scale of 1 was reversed to 5, a response on a scale of 2 was reversed to 4, and so on. Cavana et al. (2001) recommended combining positively and negatively worded questions in a questionnaire to minimise the tendency of respondents to tick on the

answers towards one end of the scale. "A good questionnaire should therefore include both positively and negatively worded questions" (Cavana et al., 2001, p. 230).

As for the TQM variables, various measurement scales were used to denote the level of TQM implementation. For example, the scale for items 1 and 2 ranged from "very little" to "a great deal". The scale for item 3 ranged from "not at all" to "precisely", and the scale for item 4 ranged from "building it in" to "inspecting it in". While items 5 to 7 required the respondents to provide the absolute number in the form of a percentage, items 8 to 10 required them to tick on specific statements on the scale ranging from "little or none" to "consistent use".

Similar to JIT, the measures for AMT can also be divided into two parts: the implementation of AMT technologies and the integration of computer technologies. The level of implementation of AMT technologies was measured on a scale of N/A (If the technology is not applicable for your operation), 1 (Not used at all) to 5 (Extensively used) and the level of integration of computer technologies was measured on a scale of N/A (Not applicable), 1 (Not computer integrated at all) to 5 (Completely computed integrated). In Snell and Dean's (1992) study, the scale for 'Not applicable' was only used for the level of computer integration and not for the level of AMT technologies implementation. However, the current study used the scale of 'Not applicable' to both parts because the firm may not adopt certain AMT technologies because they are not relevant to the firm's production processes.

4.2.4.4   Management Accounting Systems

The current study used managers' use of MAS information in measuring the extent of MAS information being used by manufacturing firms in Malaysia. This study utilised the perceived usefulness of MAS information introduced by Chenhall and Morris (1986), which consisted of four dimensions: scope, timeliness, integration and aggregation.

All dimensions for MAS information were measured on a five-point Likert scale. The scale for scope, integration and aggregation ranged from "not used at all" to "extensively used", whereas the scale for timeliness ranged from "strongly disagree" to "strongly agree". Chenhall and Morris (1986) examined the "perceived usefulness" of MAS information. However, the current study measured the extent of managers' use of MAS information. This modification is necessary because even though the information is perceived as useful, if it is not used, it would not have any impact on performance. Boulianne (2007) also employed the extent of use of MAS information rather than perceived usefulness of MAS information.

There were five questions in the scope section. The questions were related to the characteristic of broad scope MAS information: external information, non-economic information, future oriented, non-financial information for production and market, and probabilistic. This type of information ranged from narrow scope at one end to broad scope at the other. Narrow scope information is normally associated with financial, historical and internal information. Traditional MAS is viewed as having narrow scope

information characteristics. In contrast, broad scope information focuses on non-financial, future oriented and external information.

The timeliness of MAS information was measured by four questions, which include speed of reporting, frequency of reporting, automatic receipt, and immediate reporting. It refers to the managers' ability to react to a particular event in a timely manner.

The level of integration was measured using three questions focusing on precise targets, organisational effects, and sub unit interaction. This dimension concerns the integration between departments within the organisation, for instance, information on other departments' activities and the impact of the decisions made by one department on the performance of other departments.

Finally, the level of aggregation was measured by seven questions: aggregation around functional areas/time periods/responsibility centres, provision of unprocessed data, information provided for "what if analysis" and decision models, and segregation of fixed and variable costs.

Table 4.8: Measures for Management Accounting Systems (MAS)

		1	2	3	4	5
A.	**SCOPE**					
	1 = Not used at all <----------------------------> 5 = Extensively used					
1.	Information that relates to possible future events (if historical information is most widely used, mark the lower end of the scale).					
2.	Non-financial information that relates to: a) Production information such as machine efficiency, output rates, scrap levels, employee absenteeism, etc. b) Market information such as market size, growth share (if you find that a financial interpretation of production and marketing information is most widely used, please mark the lower end of the scale).					
3.	Quantification of the likelihood of future events occurring (e.g. probability estimates).					
4.	Information on broad factors external to your organisation, such as economic conditions, population growth, technological development, labour market, etc.					
5.	Non-economic information, such as customer preferences, employee attitudes, labour relations, attitudes of government and consumer bodies, competitive threats, etc.					
B.	**TIMELINESS**					
	1 = Strongly disagree <----------------------------> 5 = Strongly agree					
1.	Requested information arrives immediately upon request.					
2.	Information supplied to you automatically upon its receipt into information systems or as soon as processing is completed.					
3.	There is no delay between an event occurring and relevant information being reported to you.					
4.	Reports are provided frequently on a systematic, regular basis, e.g. daily reports, weekly reports (for less frequent reporting, mark lower end of a scale).					
C.	**INTEGRATION**					
	1 = Not used at all <----------------------------> 5 = Extensively used					
1.	Presence of precise targets for each activity performed in all sections within your department.					
2.	Information that relates to the impact that your decisions have on the performance of other departments.					
3.	Information on the impact of your decisions throughout your business unit, and the influence of the other individual's decisions on your area of responsibility.					

Table 4.8: Measures for Management Accounting Systems (MAS) (continued)

		1	2	3	4	5
D.	**AGGREGATION**					
	1 = Not used at all <-----------------------------> 5 = Extensively used					
1.	Information provided on the different sections or functional areas in your organisation, such as marketing and production, or sales, cost, or profit centres.					
2.	Information on the effect of events on particular time periods (e.g., monthly/quarterly/annual summaries, trends, comparisons, etc.).					
3.	Information which has been processed to show the influence of events on different functions, such as marketing or production associated with particular activities or tasks.					
4.	Information on the effect of different sections' activities on summary reports such as profit, cost, revenue reports for: a) your particular sections b) the overall organisation					
5.	Information in forms which enable you to conduct "what if analysis".					
6.	Information in formats suitable for input into decision models such as: a) discounted cash flow analysis b) incremental or marginal analysis c) inventory analysis d) credit policy analysis					
7.	Costs separated into fixed and variable components.					

4.2.4.5 Business Unit Performance

This study used business unit performance similar to Mia and Clarke's (1999) study. The business unit performance measures the extent to which the unit is successful in achieving its planned targets. This is done by comparing the previous years' actual performance with the target performance. This study used five years average performance rather than single year performance due to the current economic turmoil that affected many organisations worldwide. It is expected that the business performance will be perceived more towards "poor performance" if current year business performance is used. Moreover, the effectiveness of certain manufacturing

techniques, strategy, and accounting systems could be seen after a certain period of implementation. Even though the effects of these techniques could be seen immediately after the implementation, it might reflect in the performance indicators after a certain period. Therefore, it is more accurate to assess business performance over several years rather than a single year assessment. Multiple year assessment of performance was also used by Swamidass and Newell (1987), Simon (1987), Isa (2005), and Jusoh (2006), among others.

There were nine dimensions of performance: productivity, costs, quality, delivery, service, sales volume, market share, profit (if applicable), and overall performance. Similar to the instrument to measure the intensity of market competition, the purpose of overall performance (item 9) is merely to serve as a control item in order to examine the consistencies in the responses provided for the other eight items. Thus, it is not included in the determination of the overall mean for business unit performance.

The managers were required to indicate their perceived business unit performance on a five-point Likert scale where 1 represents "poor performance" and 5 represents "excellent performance". It has to be noted that Mia and Clarke (1999) used a seven-point Likert scale. The deviation from the measurement scale used by Mia and Clarke (1999) is merely to standardise the scale used throughout this study.

One of the advantages of this performance measurement, as highlighted by Mia and Clarke (1999), is that it includes both financial and non-financial measures of performance. Out of nine performance items developed by Mia and Clarke (1999), four items relate to financial performance and four items relate to non-financial performance. Costs, sales volume, market share, and profit are categorised as financial performance,

whereas productivity, quality, delivery, and service are categorised as non-financial performance. Furthermore, it is expected that the use of financial measures such as return on investment (ROI) might not be a good measure of performance, especially during the financial crisis faced by organisations worldwide.

Table 4.9: Measures for Perceived Performance

		1	2	3	4	5
1.	Attainment of targets related to productivity					
2.	Attainment of targets related to costs					
3.	Attainment of targets related to quality					
4.	Attainment of targets related to delivery					
5.	Attainment of targets related to service					
6.	Attainment of targets related to sales volume					
7.	Attainment of targets related to market share					
8.	Attainment of targets related to profitability					
9.	Overall performance based on all criteria above (1-8)					

Scale: 1 (Poor performance) to 5 (Excellent performance)

All variables used in this study were measured based on the perceptions of managers. For example, the performance of the organisation was measured using perceived performance rather than objective performance. There are several reasons for using managers' perceptions. First, the variables used in this study, such as the intensity of market competition and strategy, are difficult to measure objectively. There is no index available to measure such variables. Second, managers are directly involved in strategy and IMP implementations, as well as the use of MAS in the organisation. Thus, their perceptions on these variables can be relied on. Third, even though financial performance can be measured using profitability indices, such as ROA and ROI, however, this type of information is too confidential for disclosure by managers. Furthermore, the sample firms used in this study consisted of both public listed and private firms. The financial information may be available for the public listed firms but not for the private firms. Fourth, different organisations may adopt different methods of

accounting treatment such as inventory valuation and depreciation method. The inconsistencies in the accounting treatment may reduce the comparability of the results if objective performance is used. Finally, due to the confidentiality of information, it is expected that a higher response rate can be obtained by using perceived measures.

Table 4.10 depicts the summary of the questions used in the questionnaire and their relationships with research objectives and hypotheses.

Table 4.10: Summary of Research Objectives, Hypotheses and Questions

Research Objectives	Hypotheses	Questions
1) To examine the relationship between intensity of market competition and the use of integrated manufacturing practices.	H1: There is a positive relationship between the intensity of market competition and the use of integrated manufacturing practices.	Section A: Assessment of perceived market competition (based on Khandwalla, 1972, 1973, and Mia & Clarke, 1999). Section C, D and E: Assessment of integrated manufacturing practices (AMT, TQM and JIT) based on Snell & Dean (1992) and Koc & Bozdag (2009).
2) To examine the relationship between strategy and the use of integrated manufacturing practices.	H2: There is a positive relationship between the prospector strategy and the use of integrated manufacturing practices.	Section B: Assessment of business strategy (based on Miles and Snow, 1978) and the instrument similar to Parnell (1997). Section C, D and E: Assessment of integrated manufacturing practices (AMT, TQM and JIT) based on Snell & Dean (1992) and Koc & Bozdag (2009).

Research Objectives	Hypotheses	Questions
3) To examine the relationship between integrated manufacturing practices and business unit performance.	H3: There is a positive relationship between integrated manufacturing practices and performance.	Section C, D and E: Assessment of integrated manufacturing practices (AMT, TQM and JIT) based on Snell & Dean (1992) and Koc & Bozdag (2009). Section G: Assessment of perceived business unit performance (based on Mia and Clarke, 1999).
4) To examine the relationship between integrated manufacturing practices and MAS.	H4: There is a positive relationship between integrated manufacturing practices and managers' use of MAS information.	Section C, D and E: Assessment of integrated manufacturing practices (AMT, TQM and JIT) based on Snell & Dean (1992) and Koc & Bozdag (2009). Section F: Assessment of MAS (based on Chenhall and Morris, 1986).
5) To examine the relationship between MAS and business unit performance.	H5: There is a positive relationship between managers' use of MAS information and performance.	Section F: Assessment of MAS (based on Chenhall and Morris, 1986). Section G: Assessment of perceived business unit performance (based on Mia and Clarke, 1999).

Research Objectives	Hypotheses	Questions
6) To examine whether MAS mediate the relationship between integrated manufacturing practices and business unit performance.		Section C, D and E: Assessment of integrated manufacturing practices (AMT, TQM and JIT) based on Snell & Dean (1992) and Koc & Bozdag (2009). Section F: Assessment of MAS (based on Chenhall and Morris, 1986). Section G: Assessment of perceived business unit performance (based on Mia and Clarke, 1999).

4.3　　　Semi Structured Interview

The second phase of data collection was carried out through interviews. The objective of the interviews was to obtain further insights and gather in depth information on the role of management accounting systems in manufacturing firms in Malaysia as well as factors that affect the implementation of integrated manufacturing practices. The qualitative data gathered from interviews could enrich the earlier findings obtained from the questionnaire survey especially related to unexpected findings. In addition, by conducting interviews, the researcher can explore, understand, discuss and uncover complex issues that are difficult to articulate (Cavana et al., 2001).

Interviews can be categorised into three groups: structured, semi-structured and unstructured interviews. According to Cavana et al. (2001), highly structured interviews are conducted when the interviewer already knows what type of information is needed. The interviewer already has a list of predetermined and standardised questions that are sequentially ordered and worded in an interview schedule, and the interview process follows exactly the same questions with the same order. Thus, it limits the interviewee in providing further information. In contrast, in highly unstructured interviews, the interviewer does not have a planned sequence of questions to be asked to the interviewee. The objective of the unstructured interview is to obtain preliminary issues that need further investigation. The unstructured interview is only suitable if limited information is available. The semi-structured interview combines the characteristics of structured and unstructured interviews. It can be conducted either as an unstructured interview, i.e. by commencing interviews with primary, overall and more open questions and then focusing on the planned questions, or as a structured interview, i.e. by having a set of pre-planned questions for the interview process. However, in the semi-structured interview, the interviewer does not have to follow the questions and their sequence exactly. The pre-planned questions only serve as a guideline for the interview. Additional information could also be obtained from the interviewee. Therefore, it is not as rigid as a structured interview. This study employed a semi-structured interview since a reasonable amount of information on the issues is already known through the questionnaire survey. Thus, only specific primary questions on each issue that needs to be asked to obtain further insights and gather in-depth information.

4.3.1 Respondents for the Semi Structured Interviews

The targeted respondents for the interviews were selected based on the responses received from the questionnaire survey. Since the main purpose of the interview is to supplement the survey findings and due to the time and cost constraints, only ten respondents or nearly ten per cent of the total survey responses were selected. The following procedures were used in the selection of interview participants. First, those survey respondents who provided their contact details and were located in the Klang Valley were identified. Second, as the interview participants also need to have vast experience and in-depth knowledge about the overall operation of the firms, managers with more than five years working experience in the current firm were selected. Third, the selected respondents from various industries were chosen in order to obtain representation from different industries. This is because managers from different industries may have different perceptions and opinions regarding issues on competition, strategy, IMP, MAS and performance. Therefore, by compiling their perceptions and opinions, it is expected that broader and more valuable information could be gathered.

4.3.2 Administration of the Semi Structured Interviews

There are two common ways of conducting an interview in business research: face-to-face and telephone interviews. The choice of interview method depends on the level of complexity of the issues involved, the duration of the interview, the convenience of both parties, and the geographical area covered by the survey (Cavana et al., 2001). Telephone interviews are more suitable when a large number of respondents from

various geographical areas are involved and requires less time to complete. It is also common for the unstructured interview to be conducted face-to-face due to the complexity of the issues, whereas structured interviews can either be conducted face-to-face or over the telephone. One of the advantages of face-to-face interviews over telephone interviews is that the interviewer can detect non-verbal cues from the interviewees. In addition, the interviewer has ample time and opportunity to explain and clarify doubts, so that the interviewee can understand better. This study adopted face-to-face interviews because the researcher felt that more information could be obtained by personally visiting the respondents so that the respondents could see the genuineness of the interview purpose.

After the interviewees were identified, they were contacted, either by mail (postal or e-mail) or telephone calls to invite them to participate in the interview. A copy of the letter requesting their participation in the interview is attached in Appendix B-1. Once they agreed to participate in the interview, an appointment with everyone of them was made. The date, time and venue of the interviews to be held were decided by the interviewees at their own convenience.

Before the interview commenced, the interviewer introduced herself and the affiliation that she represented. Then, the interviewer explained the purpose of the interview as well as assuring confidentiality of the interviewee's identity and the information given. The interviewer also requested the interviewee's permission to record the session to minimise the loss of information and for future reference. The interviewer only has a right to record a session when consent is granted. Otherwise, the interviewer should listen carefully and take as many notes as possible during the interview session. Finally, the interviewer briefly explained the definition of terms used in the interview process.

During the interview, in order to avoid any bias, the interviewer needs to be as neutral as possible. To avoid bias during the interview, the interviewer did not give her own comments or opinions on the issues being discussed and the interviewees were given the freedom and sufficient opportunity to express their opinions without interference from the interviewer.

After the interview session ended, a token of appreciation was given to every interviewee for his or her willingness to participate in the interview and share valuable information. Once again, they were promised that the information provided would be used solely for academic purposes and treated in the strictest confidence. The data from the interview was immediately transcribed to prevent loss of data.

4.3.3 Design of the Interview Guide

Since this study employed a semi-structured interview, an interview guide was designed as a guideline for the questions to be asked to the interviewees. However, the questions were not limited to those stated in the interview guide. They could be modified depending on the flow of thoughts of the interviewee. Similarly, the sequence of the questions could also change.

There were four sections in the interview guide. Section A covered issues on market competition. There were five questions relating to the competition in general as well as the influence of market competition on the use of IMP. Section B covered issues on strategy and the influence of strategy on the use of IMP. There were four questions in

this section. Section C asked the interviewees about the relationship between IMP and performance. Similar to Section A, there were also five questions in this section. Finally, Section D focused on the role of MAS information in manufacturing firms. There were three questions about MAS information and the role of MAS information in helping organisations to improve performance. In addition, the interviewees were also required to provide some general information about themselves and the organisations for which they worked. The information includes job designation, work experience, gender, age, type of industry, number of employees, years in operation and ownership.

Unlike questionnaire surveys that use only closed-ended questions, only open-ended questions were used in the interview to allow the interviewees to freely express their opinions without any constraints. They were also allowed to give their opinions on other issues related to competition, strategy, IMP, MAS and performance. The interview guide is attached in Appendix B-2.

4.4 Data Analysis Techniques

4.4.1 Data from the Questionnaire Survey

Questions from the questionnaire survey comprised both interval and ratio data. The data were analysed using both SPSS version 17.0 software for Windows and SmartPLS version 2.0 software. The results for descriptive statistics and tests of difference (independent sample t-test) to check for response bias were produced using SPSS while tests for validity, reliability and hypotheses testing were conducted using SmartPLS.

This study used Partial Least Squares (PLS) path modelling analysis. PLS is a branch of Structural Equation Modelling (SEM). SEM is classified as a second generation of multivariate analysis that has higher flexibility compared to first generation of multivariate analysis such as principal component analysis, factor analysis, discriminant analysis or multiple regression (Ghozali, 2008). SEM can also examine multiple relationships simultaneously as compared to other techniques that can only examine a single relationship between the dependent and independent variables at one time (Hair et al., 1998). For example, a dependent variable in an equation may become an independent variable in another equation. SEM can analyse these relationships simultaneously in one model at the same time. Hair et al. (1998) define SEM as a multivariate technique that combines aspects of multiple regression and factor analysis to estimate a series of interrelated dependence relationships simultaneously.

In management accounting research, which often uses surveys as a method for data collection, the use of composite measures to measure constructs may lead to measurement error. These constructs or latent variables cannot be measured directly. They need to be operationalised into measurable and observable variables, which are called indicators or manifest variables. Wrong classification of indicators to measure a latent variable, data entry errors, dissimilar interpretations between the researcher and the respondent, data collection and measurement techniques are typical measurement errors that occur, especially in survey research (Smith and Langfield-Smith, 2004). Therefore, it is suggested that SEM is more appropriate for management accounting research due to its ability to account for the effects of estimated measurement error of latent variables (Smith and Langfield-Smith, 2004).

Generally, there are two types of SEM model that are widely used in management research, i.e. Covariance Based SEM and Component Based SEM. Covariance Based SEM is represented by software such as AMOS and Linear Structural Relation (LISREL), whereas Variance Based SEM or Component Based SEM is represented by SmartPLS, PLSGraph, and VisualPLS, among others.

According to Ghozali (2008), there are several assumptions that need to be fulfilled before Covariance Based SEM can be used. For example, data must be normally distributed, the indicator model must be reflective, the variable measurement scale needs to be continuous, and a large sample size is required. In contrast, Component Based SEM ignores all the assumptions due to its non-parametric nature. The data need not to be normally distributed, the indicator model can be reflective and/or formative, the measurement scale can be nominal, interval or ratio, and a complex model with 100 indicators can still be analysed with only 50 samples.

Covariance Based SEM also requires the causal relationship to be based on theory and must have strong theoretical support in order to test or confirm the theory and model with empirical data. In contrast, Component Based SEM focuses on the prediction model in order to explain the relationships between and among variables. Thus, theory is not so crucial in Component Based SEM even though it can still be used to confirm the theory. Ghozali (2008) also highlighted that Component Based SEM can avoid the problems of improper solution due to negative variance (Heywood case), factor indeterminacy due to unidentified model, and non-convergence algorithm. Table 4.2 lists the difference between Component Based SEM (PLS) and Covariance Based SEM (CBSEM).

Table 4.11: Difference between Component Based SEM (PLS) and Covariance Based SEM (CBSEM)

Criteria	PLS	CBSEM
Objective	Prediction orientation	Parameter orientation
Approach	Variance based	Covariance based
Assumption	Predictor specification (non-parametric)	Multivariate normal distribution, independent observation (parametric)
Parameter estimation	Consistency at large	Consistent
Latent variable score	Explicitly estimate	Indeterminate
Epistemic relationship between latent variable and its indicator	Can be in the form of reflective or formative	Only with reflective indicator
Implication	Optimal for prediction accuracy	Optimal for parameter accuracy
Model complexity	High complexity (100 constructs and 1000 indicators)	Low to medium complexity (less than 100 indicators)
Sample size	Minimum recommendation around 30 to 100 cases	Minimum recommendation around 200 to 800 cases

(Source: Ghozali, 2008)

Due to the flexibility and less stringent assumptions of Component Based SEM, such as small sample size, this study adopted Component Based SEM with SmartPLS software as a technique for data analysis. Specifically, this study employed the path analysis method, where simple bivariate correlations are used to estimate the relationships between variables in a set of structural equations simultaneously. Thus, the direct and indirect effects of independent variables on dependent variables can be analysed

together. Furthermore, the strength of each relationship or path can be measured by a simple bivariate correlation.

Before analysing the data, the questions in the survey form were coded and sequentially numbered for each section. The coding and numbering systems were in accordance with the sequence of the questions in the questionnaire survey form. Thus, the questionnaire form served as a codebook for this purpose.

Data were then entered into Microsoft Excel and comma separated value (csv) format, which is compatible with SPSS and SmartPLS. SPSS, for example, requires data in Excel format whereas data for SmartPLS must be converted into csv format before they can be analysed using its software.

The next step involved checking data for reliability and validity. Hair et al. (1998, p. 3) define reliability as the "extent to which a variable or set of variables is consistent in what it is intended to measure" whereas validity is defined as the "extent to which a measure or set of measures correctly represents the concept of study". While reliability concerns the consistency of the measure(s) and how it is measured, validity focuses on how accurate the concept is defined by the measure(s) and what should be measured. Validity also refers to the degree to which it is free from any systematic or non-random error. Reliability refers to the degree to which it is free from random error to produce consistent results. Thus, reliability and validity are two distinct concepts. A measure may be accurate (valid) but not consistent (reliable), or vice versa. Reliability and validity tests are important, especially in survey research, where the measurement of variables mainly depends on the classification by the researcher. In PLS path modelling analysis, these tests are part of the assessment of the outer model. Only after these two

tests have been conducted can subsequent analyses be performed. These tests will be discussed in detail in the next chapter.

Descriptive analyses were then carried out to tabulate the demographic profiles of both the respondents and firms, as well as to obtain the frequency distributions of the responses. Descriptive analyses were also performed to tabulate the mean scores, standard deviations, minimum and maximum values for all variables. Finally, the inner or structural model was assessed. The assessment of the inner model comprises the evaluation of R-square (R^2) of endogenous latent variables and estimates for path coefficients (β). Path coefficients and their significances are used to test various hypotheses, including their direction and significant level.

4.4.2 Data from the Semi Structured Interviews

Unlike the surveys, the data from the semi-structured interviews were in the form of transcribed text and hand-written notes. Thus, the data could not be analysed using the same technique as the survey. The data were descriptive in nature and, therefore, powerful statistical analyses such as multivariate analyses could not be performed. Only descriptive analysis such as frequency distribution to tabulate the demographic profiles of both the respondents and firms, as well as to obtain the frequency distributions of the responses could be performed. Other data had to be analysed manually by combining the responses under similar categories, and their summaries were presented in the report. Then, the results from the interviews were compared with the results obtained from the survey to see if there were any variations. It is also useful in assessing the validity of the survey results. There are computer softwares to analyse qualitative data

such as NVIVO. However, since the number of interviews is small, similar to Isa (2005), the data were analysed manually. The results from the interviews are discussed in Chapter 5.

4.5   Chapter Summary

This chapter contains discussions of the research methodology for the study. It starts with an introduction, followed with a discussion of research design in section 4.1. Then, a detailed discussion of sample selection and data collection methods, which includes questionnaire survey and semi structured interview, is presented in sections 4.2 and 4.3, respectively. Finally, a thorough explanation of data analysis techniques is discussed in section 4.4.