CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

The main purpose of this study is to examine the intellectual capital, knowledge sharing and innovation in small and medium enterprises in Malaysia. In designing this research, it is important that certain choices of procedures and methods are made to enhance the validity of the study results (Bickman and Rog, 1998). This is mainly achieved through mounting the most rigorous designs in data collection from objective sources and designing studies that have universal generalizability. The chapter will begin with the philosophy of the research and a discussion about the approach of this study. This is followed by a discussion on the conceptual framework, highlighting the independent variable, dependent variable and mediating variables. Subsequently, hypotheses development will be elaborated upon in testing the relationship of the variables. There are eight hypotheses in this study. The research design will describe the method used for this study and the flow of research is shown in a flow chart. Next the data collection method, which utilizes questionnaires, will be discussed. The survey validation method, translation, pre-test, pilot test and reliability test will be explained. The data analysis plan is to navigate the data analysis process, which uses Amos version 16 for Structural Equation Modelling. This chapter will attempt to highlight the methodological framework adopted in this study in assisting the researcher in fulfilling the research objectives and research questions of this study.

4.2 Philosophy of Research

Creswell (2000), as cited by Nemani (2009), states that the design of any research study begins with the selection of a topic and a research methodology. There are three orientations to research: post-positivist research (quantitative), interpretive research (qualitative) and critical research (critical theory). The objective of this study is to develop an alternative path or process in the existing framework that will enhance the outcome. This study also attempts to predict and explain by discovering the necessary and sufficient conditions for the framework model. The framework was developed through identifying the gaps in the existing frameworks through a review of the literature. The literature review identified the sources and extracts in an attempt to define the problem statement and develop preliminary theories (Sekaran, 2003). Research questions and hypotheses have been developed to navigate the research process. A quantitative approach will be used to gain insight into the research problem.

As this study attempts to understand human problems by applying the right technique, assumed knowledge is more like an "object" that can be readily stored, retrieved at will and shared, therefore, the researcher opted to use a positivist approach. Positivism is an epistemological perspective and philosophy of science, which holds that the only authentic knowledge is that which is based on actual sense experience (Bryman, 1988). Positivism is based on the epistemology that objective reality exists versus interpretivism, which is based on the subjective lens of the researcher's perspective and experience. However, according to William (2008), neither the positivistic view nor the interpretative

are adequate in covering all forms of knowledge and information as they are dependent on the framework of the research.

4.3 Conceptual Framework

As discussed in Chapter Two in the literature review, this study explores the relationship of intellectual capital and organizational performance as discussed by previous researchers. In addition, this study will explore further by integrating knowledge sharing and innovation into the framework and making it an integrative framework. The framework for this study is the outcome from the relationship deduced from the review of the literature. The literature review of intellectual capital based on the works of Bontis (1998), Bontis et al., (2000), Chen et al. (2004), Lee and Choi (2001) and Cohen and Kaimenakis (2007) contributed to this conceptual framework. Previously, the intellectual capital framework would have the intellectual capital as an independent variable and organizational performance as its dependent variable. Intellectual capital consists of human capital, structural capital and relational capital.

For this study, the framework has been further extended with the inclusion of knowledge sharing and innovation as mediating variables. It was developed by integrating several direct relationships among study variables to come up with the deduced framework. Intellectual capital consists of human capital, structural capital and relational capital. Knowledge sharing is made of trust, social network, and communication. Innovation comprises product innovation and process innovation. Organizational performance is measured by financial indicators. Figure 4.1 illustrates the conceptual framework.

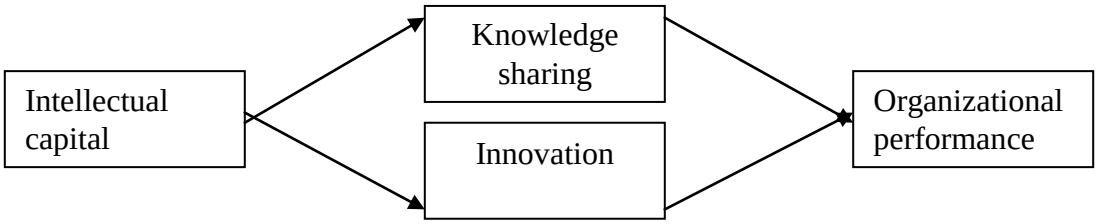


Figure 4.1
Conceptual Framework

The framework also proposes a direct link between intellectual capital (IC) and knowledge sharing (KS), and intellectual capital (IC) and innovation (INV). Alternatively, knowledge sharing (KS) has a direct link to Innovation (INV). The relationships shown in the framework, suggest that knowledge sharing (KS) and innovation (INV) play a role in the intervention between intellectual capital (IC) and organizational performance (OP). Figure 4.2 presents the study framework. The literature review was used to identify the measurement items, as shown in Table 4.1, and details are shown in Appendix 5.

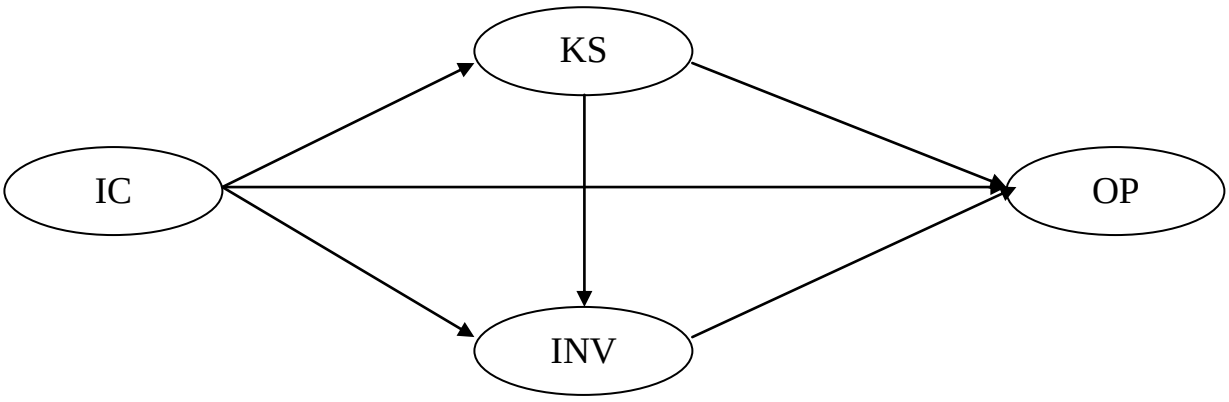


Figure 4.2
Research Framework

4.4 Research Design

This study will be conducted according to the steps outlined in Figure 4.3, which presents the research process flow chart for this research.

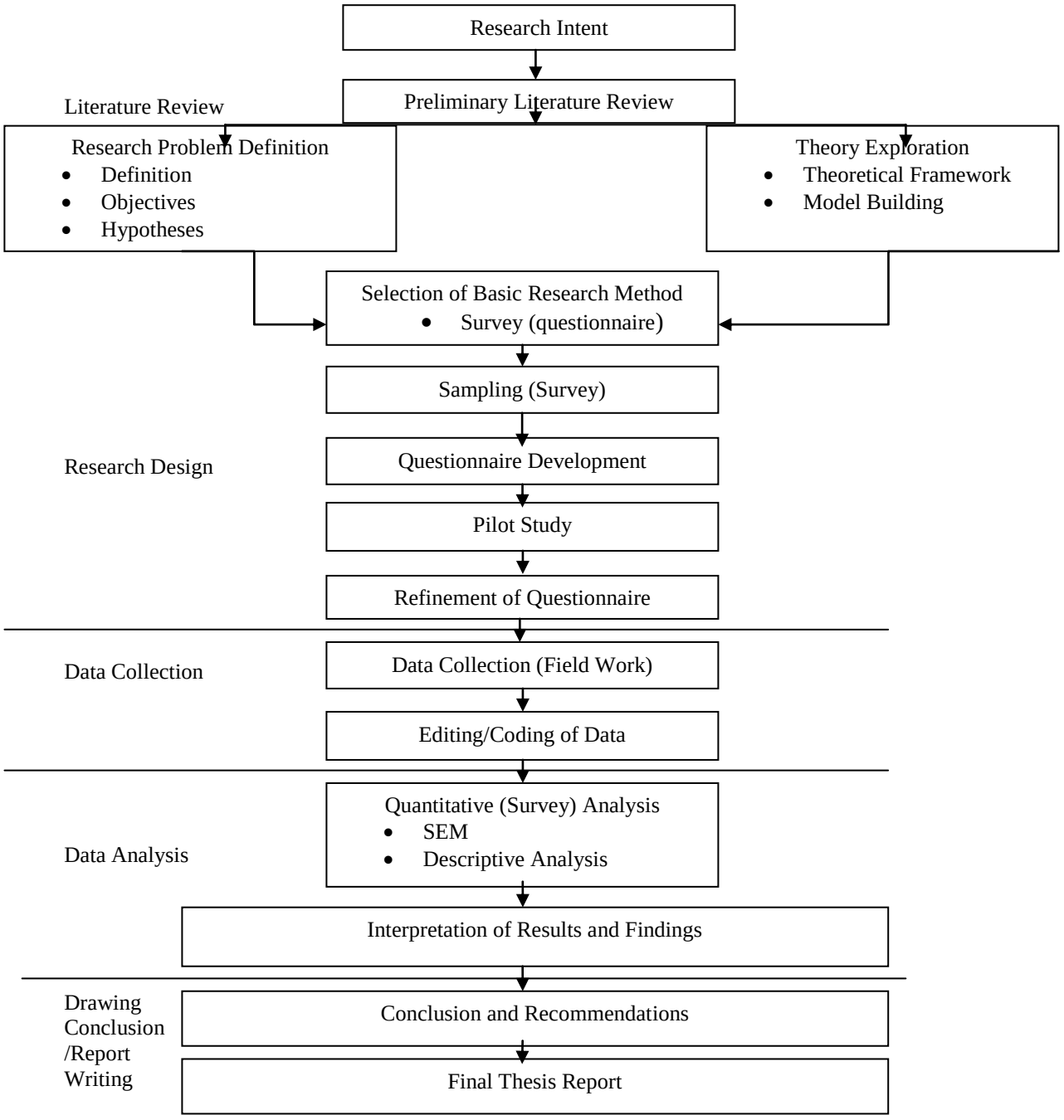


Figure 4.3
The Research Process Flow Chart

The steps include: literature review, research design, data collection, data analysis and drawing up the conclusions and report writing. In the following paragraph and in subsequent sub-sections, discussion of the research design, data collection and data analysis processes are covered. Data or information (primary data) will be obtained by using the survey method, namely, a questionnaire survey.

This method, as described by Zikmund (2003), is a method for gathering a primary database on communication with a representative sample of subjects of study. It is a research technique in which information is gathered from a sample by way of a questionnaire or interview. Conversely, Fowler (2001) identifies factors that influence the quality of data from a survey; the size and representativeness of the sample from which the data is collected; the techniques used for collecting the data; the quality of the interviewing; if the interviewers are used; and the extent to which questions are good measures. This entails researchers to consider all sources of error when making survey design decisions. Margione (1998) points out those four major types of errors can be encountered in a survey; sample selection bias, non-response error, item non-response errors and response error. Margione again stresses the importance of "designing quality" in all stages of a survey, referring to the aspect of optimizing efforts across all areas as "total survey design", as confirmed by other methodologists including Groves (1989) and Biemer et al. (1991).

4.4.1 Sampling Design

Respondents of this survey are owners and managers of the SMEs. The choice to use the single respondent approach is based on the criteria for SMEs (Avlonitis and Salavou, 2007). The choice to use the single respondent approach is based on both the size

of the firms as well as the respondent's familiarity with the research topic and the information sought. Especially, in the case of SMEs the view of a single respondent may, in fact, reflect those of the firm (Lyon et al., 2000). Furthermore, consistent with previous research within entrepreneurial organizations, surveys were addressed to either the owner of general manager of each SME (Lumpkin and Dess, 1996; Miller, 1983). In the studies of young and/or small businesses, it is often rely on the response of a single key player to represent the views of the whole firm (Brush and Vanderwerf, 1992; Chandler and Hanks, 1993). The use of single respondents can increase the possibility of common method variance problem which can artificially amplify relationships (Campbell and Friske, 1993 as cited in Lyon et al. 2000). There are advantages to use only a single informant such as the high likelihood that the most knowledgeable individual in the organization would provide the information, in small firms, the views of the respondent may, in fact, reflect those of the firm. Beside, the use of a single respondent also helps to increase the participation of more firms since only one individual in the organization is impacted. Previous researchers found strong evidence of convergent and discriminant validity between self-reported business volume and sales growth through factor and alpa factor. Thus, research using single-respondent self-reports can be an appropriate and necessary means of operationalizing key constructs when carefully performed (Chandler and Hanks, 1993). Furthermore, the geographically confined nature of the sample as well as the reliance on select Asian markets also limit the extent to which any conclusions may be generalized beyond the range represented by the sample (Jogaratnam and Tse, 2006).

The list of SMEs provided by the Small and Medium Development Corporation (SMIDEC) makes up the target sample. The target survey was identified using random

sampling. According to Sekaran (2003), a sample size of 384 is enough for a population of 1 million. In order to meet the representativeness criteria of a good sample collection, the questionnaires for the study were posted to 1,000 selected SMEs in the manufacturing and services sectors. The first 1,000 SMEs were selected from the list of SMIDEC. They were asked to complete the questionnaire or pass it to the managers in their organizations. Most of the entrepreneurs took part themselves as they are well-versed in the practices of their organizations and are interested in gaining knowledge in improving their system, structure and strategies. Due to the exploratory nature of this study, a cross-sectional approach was undertaken to measure firms' responses regarding this study, whereby the questionnaire was distributed throughout Malaysia.

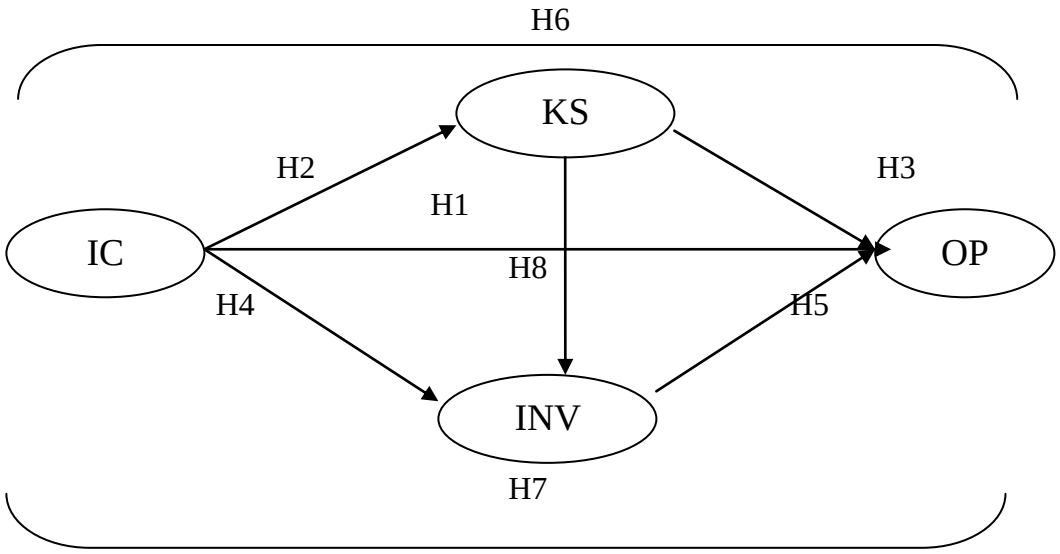
4.4.2 Population

The population frame for this study is the list of SMEs from the Small and Medium Enterprises Corporation (SMIDEC) Malaysia. Specifically, the respondents are SMEs in the manufacturing and service manufacturing sector that are considered to be involved in innovation and knowledge sharing. SMIDEC is a government-established agency to assist in the growth process of SMEs in Malaysia. Based on suggestion by Sekaran (2003), questionnaires were posted to 1,000 selected SMEs in the manufacturing and services sectors.

4.5 Hypotheses Development

The framework presented in the preceding section shows how the links for variables are hypothesized. It is noted that each variable, intellectual capital (IC), knowledge sharing

(KS) and innovation (INV) have hypothesized impacts on organizational performance (OP). Using propositions from the literature review, the hypotheses were developed and Figure 4.4 presents the hypothesized relationships and how the hypotheses feature in the proposed framework. Through the framework, knowledge sharing (KS) and innovation (INV) was posited to mediate the relationship between intellectual capital (IC) and organizational performance (OP).



Key: IC – Intellectual Capital; KS – Knowledge Sharing; INV – Innovation; OP – Organizational Performance.

Figure 4.4
The Hypotheses as Depicted in the Research Framework

The study examines the influence of intellectual capital on knowledge sharing and innovation and whether more leads to higher innovation and organizational performance.

The proposed hypotheses are:

H1: Intellectual capital has a positive impact on organizational performance

H2: Intellectual capital has a positive impact on knowledge sharing

H3: Knowledge sharing has a positive impact on organizational performance

H4: Intellectual capital has a positive impact on innovation

H5: Innovation has a positive impact on organizational performance

H6: Knowledge sharing positively mediates the relationship between intellectual capital and organizational performance

H7: Innovation positively mediates the relationship between intellectual capital and organizational performance

H8: Knowledge sharing and innovation positively mediates the relationship between intellectual capital and organizational performance

4.5.1 The Relationship between Intellectual capital and Organizational Performance

Firm growth depends on the firm's successful and creative combination of its internal knowledge and other resources acquired beyond its boundary (Mu et al. 2008). According to Bramhandkar et al. (2007), regardless of how financial performance is measured, better intellectual capital management is associated with better returns. Intellectual capital comprises human capital, structural capital and relational capital and is regarded as organizational resources or assets. The organization, which is made up from the various talents and skills of its employees, structure, system and good networking of customers and suppliers is unique compared to its competitors. Therefore, an organization should capitalize and utilize its resources to the maximum to have higher organizational performance.

H1: Intellectual capital has a positive impact on organizational performance

4.5.2 The Relationship between Intellectual Capital and Knowledge Sharing

Employees are the main element in the knowledge sharing activity. When people get together and are involved in knowledge-based discussion, they will share their personal knowledge with their colleagues. The knowledge regardless of its nature, tacit, explicit, formal or informal must be circulated in order for the knowledge to be beneficial to the organization. This knowledge flow will increase the value of the existing knowledge as expanded knowledge becomes valuable and meaningful. The structural capital is not only a mechanism to take advantage of the information and knowledge but also a mechanism to capture, store, retrieve and communicate the knowledge and information (Koenig, 1984). The knowledge, either tacit or explicit, which is acquired and gathered through the interaction with customers, suppliers or any outside party, will help the organization to generate, acquire and restore its knowledge asset. Tacit knowledge is the key element of knowledge sharing, and the knower must be willing to share the knowledge. Factors such as motivation of the sender and recipient (Huber, 2001), reward and benefit of sharing (Gupta and Govindarajan, 2000, Kaiser and Miles, 2001, Dyer and Nobeoka, 2000), technical ease of sharing (Decarolis and Deeds, 1999), the utilization of shared knowledge (Cohen and Levinthal, 1990), and the characteristics of the knowledge (Gupta and Govindarajan, 2000) are, among others, important to facilitate the movement of knowledge within and between organizations.

H2: Intellectual capital has a positive impact on knowledge sharing

4.5.3 The Relationship between Knowledge Sharing and Organizational Performance

Knowledge sharing is crucial as it links individual learning with organizational learning (Kim, 1993). As suggested by the resource-based theory of the firm (e.g.Wernerfelt, 1984) and the knowledge-based theory of the firm (e.g.Nonaka, 1994, Grant, 1996, Kogut and Zander, 1992) tacit knowledge can be a source of competitive-advantage for the firm. The value of a company's information asset no longer lies in the ability to store and retrieve information but in dynamic matching of the information to specific processes and unknown situations (Chen et al. 2008). Therefore, knowledge is an asset that should be managed well to be more valuable and more meaningful. Based on the Resource-Based View (RBV), the firms for which information is a valuable resource will utilize knowledge sharing to enhance organizational knowledge (Lin, 2007). Thus, increased knowledge sharing has led to greater back-office efficiency, greater customer intimacy, improved strategic planning, flexible adaptation to market changes, improved decision making, and other organizational benefits, which is organizational performance.

H3: Knowledge sharing has a positive impact on organizational performance

4.5.4 The Relationship between Intellectual Capital and Innovation

Leadership and ideas are part of human capital. Innovation depends on people's knowledge while the process of innovation takes place in structural capital (Johnson, 2002). Structural capital that provides the platform and processing venue for ideas and creativity is an important element for encouraging innovation. Ideas and knowledge gathered from the relationship of customers, suppliers and authorities formed relational capital. These ideas

and knowledge will help an organization in producing a process or product innovation that is marketable and meets the customers' needs.

H4: Intellectual capital has a positive impact on innovation

4.5.5 The Relationship between Innovation and Organizational Performance

Innovation has a positive relationship to organizational performance regardless of industries (Deshpande et al. 1993; Hurley and Hult, 1998; Kohli andJaworski, 1993; Keskin, 2006; Atuahene-Gima, 2001; Damanpour; 1991, 1996) and this is also found in the SMEs' performance (Wolff andPett, 2006; Montequin, 2006). As innovations that meet the needs of the customers will give an organization an advantage in the market and, thus, enable them to make a profit.

H5: Innovation has a positive impact on organizational performance

4.5.6 Intellectual Capital, Knowledge Sharing and Organizational Performance

At every minute, knowledge is circulating in the organization from the employees to top management, from customers to employees, employees to employees and so on. Consciously or unconsciously, knowledge is being shared, transferred and circulated within and outside the organization in every transaction and activity. This continues to occur as long as people are interacting and communicating. The collective individual knowledge gathered through knowledge sharing activity will lead to organizational effectiveness (Huysman and Witt, 2002). The knowledge of employees (human capital), collective mindsets, culture and systems (structural capital) and value perceptions by its customers

and suppliers (relational capital) must be integrated through a knowledge sharing process so that every employee can combine their knowledge, expertise and skills to enhance the organizational performance.

H6: Knowledge sharing positively mediates the relationship between intellectual capital and organizational performance

4.5.7 The Relationship between Intellectual Capital, Innovation and Organizational Performance

There is a significant relationship between market orientation, customer orientation and even entrepreneurial orientation and organizational performance (Hurley and Hult, 1998; Kohli and Jaworski, 1993; Keskin, 2006; Atuahene-Gima, 2001; Damanpour; 1991, 1996; Wolff and Pett, 2006; Montequin, 2006, Appiah-Adu and Singh, 1998). In addition, Garcia and Calantone (2002) suggest that a single construct "product innovation" for technological-based projects can be utilized as a mediating or moderating variable or even to split innovation into product type categories. Bontis et al.'s (2000) study of intellectual capital shows the relationship of structural capital and organizational performance, which suggests an indirect relationship of innovation capital to organizational performance.

Most researchers found a positive effect for innovation as a mediating factor in the relationship of intellectual capital and organizational performance (Hurley and Hult, 1998; Kohli and Jaworski, 1993; Keskin, 2006; Atuahene-Gima, 2001; Damanpour; 1991,1996; Wolff and Pett, 2006; Montequin, 2006). Innovation needs an antecedent in order to have an impact on organizational performance. Knowledge, creativity, ideas, culture, structure, strategy and systems must be incorporated to support innovation in the organization.

Innovation, even an incremental innovation, has an impact on organizational performance (Afuah, 2003).

H7: Innovation positively mediates the relationship between intellectual capital and organizational performance

4.5.8 The Relationship between Intellectual Capital, Knowledge Sharing, Innovation and Organizational Performance

Knowledge-based resources involve both static and dynamic features. Intellectual capital being static should be in the same model with dynamic processes. Without dynamic processes, the intellectual capital is merely a static stock of assets (Hussi, 2004). Knowledge only leads to superior performance if the industry characteristics enable the knowledgeable company to derive the profits from the new ideas (Bierly and Daly, 2002). The interaction of intellectual capital with knowledge sharing and innovation will improve the quality of knowledge in the organizations, thus, enhancing its performance. As innovative activities usually take place in smaller groups, Tsai (2001) suggested that smaller groups could produce more innovations and enjoy better performance if they occupy central network positions that provide opportunities for shared learning and knowledge sharing. Knowledge sharing implies that organizationally relevant information, knowledge and expertise are spread and exchanged among individual members of an organization (Moorman and Miner, 1988, Bartol and Srivastava, 2002). Innovation requires tacit and explicit knowledge in order to create something new (Yang, 2005).

H8: Knowledge sharing and innovation positively mediates the relationship between intellectual capital and organizational performance.

4.6 Data Collection Procedure

The objective of the data collection procedure is to ensure that an efficient and accurate data collection process is conducted. This section discusses the process of data collection for this study. The data collection method for this study used a written survey questionnaire. The method of survey will be elaborated upon. The survey questionnaires were validated following a pilot test and reliability test. Details of the procedure are discussed below.

4.6.1 The Questionnaire

In gathering information pertaining to the current study, a questionnaire was used as the main instrument for data collection. Questionnaires were developed to collect data about the research model's constructs. The questionnaire consists of five sections. The first section covers intellectual capital (IC); second section is on knowledge sharing (KS); third section is on innovation (INV) and the fourth section is on organizational performance (OP). The fifth section is on the demographic profile. The demographic profile is divided into two sections, namely, organization profile and individual profile. Table 4.1 shows the measurement of items for the variables that were adopted from various authors. Firms were asked to provide information on their demographic organizational profile (type of business, employment, annual sales turnover) and individual profile (education background, working experience and area of expertise).

In the variables sections (intellectual capital, knowledge sharing, innovation and organizational performance), all questions are closed-ended questions. Intellectual capital is divided into three sections, namely, human capital (HC) –12 items, structural capital (SC) – 18 items and relational capital (RC) – 11 items; a total of 33 items for IC. For knowledge

sharing (KS), there are 18 items, innovation (INV) 11 items and organizational performance (OP) 5 items. Items statements in the variables sections are measured as subjective estimates using a seven-point Likert scale (with 1 = strongly disagree and 7 = strongly agree). The full set of these measurement items and questions are found in Appendix 7, which presents the survey questionnaire (final version).

Table 4.1 Source of Measurements

Variable	Source of Measurement Items
Intellectual capital	Bontis et al. (1998), Chen et al. (2005), Cohen andKaimenakis (2007), Narver and Slater (1990), Deshpande et al. (1993)
Knowledge sharing	Haldin-Herrgard (2000), Bock and Kim (2002), Ipe (2003), Husted et al. (2005), Chieh-Peng Lin (2007), Calatone et al. (2002), Liebowitz (1999), Choi and Lee (2002)
Innovation	Appiah-Aduand Singh (1998), GhosalandBartlet (1989),Han et al. (1998),Hurley and Hult (1998), Calatone et al. (2002), Atuahene-Gima (1995)
Organizational Performance	Calatone et al (2002),Lee and Choi (2003),Bontis (1998), Gold et al. (2001)

Compiled by researcher

4.7 Method of Survey

The mail survey was used to reach a relatively large sample of SMEs scattered throughout Malaysia. A large geographical area can be covered quickly and cheaply by this method. It is also timely, as many questionnaires are being answered in parallel. Evidence suggests that a mail survey, compared to other methods, is relatively cheap, much information can be obtained very quickly without the problems of interviewer bias and the

variability inherent in face-to-face techniques; respondent anonymity is assured; and sensitive information can be easily gathered in this way, where specific data is requested and records and other sources can be sought for verification (Forsgren, 1989). This method was chosen, as it is an efficient and accurate method of polling the opinions of the sample population and is an effective means of collecting quantitative data (May, 2002). Moreover, this type of survey offers the maximum potential to produce results that are generalizeable and precise in terms of the population (Firestone, 1997). Most researchers in relation to SMEs adopt a mail survey approach despite the difficulties associated with low response rates (Newby et al. 2003).

It is important to minimize the errors that are associated with the mail survey method of data collection (Mangione, 1998). The errors include sampling selection bias, non-response error, item non-response error and response error. The discussion on handling sample selection bias is discussed in the sampling sub-section. For the non-response error or biased nature of the responding sample, the study targets to achieve a high response rate by employing various techniques: reminders, as suggested by Cooper and Schindler (2003), telephone pre-notification (Sclegelmilch and Diamantopoulos, 1991), coloured paper (LaGarce and Kuhn, 1995), using double-sided rather than single-sided or short rather than long questionnaires (Jobber, 1989). In addition, the university logo has been found to increase response rates (Greer and Lohtia, 1994). Assurance of anonymity has generally proven successful in acquiring higher response rates (Kanso, 2000, Tyagi, 1989). By providing clear instructions, the failure of respondents to answer individual questions or item non-response error can be reduced. The questionnaire was made to look attractive, not crowded and the questions were not too long. Many of the total design method (TDM)

recommendations suggested by Dillman (1990) were adopted. The questionnaire was designed in an easy to read booklet format with a total of 11 pages.

A detailed structured questionnaire was administered at the enterprise level. A self-addressed envelope with postage was sent together with the questionnaire and cover letter. The cover letter was sent with the questionnaire addressed to the identified owner (respondents) of the organizations to be studied. The letter contained the objective of the survey, the purpose of the study and its importance, how the results were to be used, the researcher's contact number and how to deliver the completed questionnaire. In improving the response rate and to reduce the non-response bias,the assurance of confidentiality was included in the letter. In this study, to maximize the return rate, three subsequent reminders over the telephone and the mail lists which were provided by SMIDEC after the initial surveys were mailed. Telephone inquiries were conducted three weeks later as a last resort for those SMEs that had not responded. A follow up letter was sent after the expiry of the set dateline. Additional phone calls were made wherever the need arose. Appendix 6 presents the cover letter.

4.7.1 Survey Questionnaire Validation

The validity of the survey instrument is observed in its content and face validity (the assessment of the correspondence of the variables to be included in a scale and its conceptual definition) and the reliability (the extent to which measures are free from error and thereby able to produce consistent results) pertaining to its items. A comprehensive literature review and interviews with practitioners and academicians, as part of the survey instrument development procedure, enhances the content and face validity of the survey

instrument (Li et al., 1998). Measures of the focal constructs in this paper were developed from the existing literature. In this research, the items used in the data collection instrument were generated based on previous intellectual capital, knowledge sharing and innovation literature review. The questionnaire was originally prepared in English.

Before conducting the pre-test and pilot test, the questionnaire was checked for face and content validity by two foreign academicians and four local academicians who are familiar with the constructs and variables that were provided with the survey. They were either the heads of departments or lecturers who are active in the research of knowledge management, intellectual capital and entrepreneurship. They were chosen because of their knowledge and experience in similar areas. Ambiguities and sources of confusion in the questionnaire were highlighted and improved following the comments and suggestion of academicians.

4.7.2 Instrument Translation Process

In a multi-lingual society like Malaysia, translating the questionnaire into different languages has become a "standard procedure" (Ng, 2006). In addition, offering a choice of questionnaire language is one method of capturing the respondents' attention and response (Harzing, 2006; Bond and Yang, 1982). Therefore, in the questionnaire booklet, the question was posted in two language versions, English and Bahasa Melayu, as this will provide a better understanding, especially for native respondents.

Respondents have a choice to answer in either Bahasa Melayu or in English. In order to ensure that the Bahasa Melayu version correctly reflects the meaning and nuances of the original instrument, the researcher asked two of the qualified translators from Institut Terjemahan Negara (National Translation Institute) to provide the appropriate translation of

the items in the original version of the questionnaire. Both of the translators were Malays. Both of them are certified and qualified translators who have extensive experience in translation and interpretation. Each translator took a week on the translation. After a week, the translation was evaluated and they shared very close translations for the majority of the items. Some items were re-worded to be understood in the Bahasa Melayu context. In addition, to make sure that the items in the Bahasa Melayu translation have a similar meaning with the original items, back translation was conducted through an academician from the Department of English Language in the Faculty of Language, Universiti Teknologi MARA. Words or expressions were compared and revised until consensus was attained.

4.7.3 Pilot Test

To verify the validity and reliability of the instrument after the translation process and before conducting the actual study, a pilot study was conducted to check its clarity, validity and reliability. This procedure is necessary before performing the real data collection to ensure that the respondents understood the instructions and the questions asked. The instrument was piloted by administering it to thirty entrepreneurs who were attending an entrepreneurship course in the National Productivity Center (NPC), Petaling Jaya to check the wording and understanding of information in the questionnaire as suggested by Xia et al. (2007). All the samples chosen for the pilot test were from the same population in the actual survey (Malhotra and Birks, 1999). The main issues are the scrutiny and a thorough checking of the appropriateness and the language of the research constructs for the small and medium enterprises (SMEs) in Malaysia. To be valid, a

questionnaire must be understandable and easily completed by the population concerned. As no missing data was found, the questionnaire was deemed to be highly acceptable (Aron and Aron, 2002).

4.8 Reliability Test

The reliability of an instrument refers to its ability to produce consistent and stable measurements. Kumar (1996) explains that reliability can be seen from two sides: reliability (the extent of accuracy) and unreliability (the extent of inaccuracy). The most common reliability coefficient is the Cronbach's alpha, which estimates internal consistency by determining how all the items on a test relate to all other items and to the total test –internal coherence of data. The reliability is expressed as a coefficient between 0 and 1.00. The higher the coefficient the more reliable the test. The result of the pilot study showed that the Cronbach's alpha reliability coefficient for the intellectual capital was in the range of 0.609 to 0.685, knowledge sharing 0.829, innovation 0.877 and the alpha for the dependent variable, knowledge performance, is 0.907 indicating that this instrument is a reliable measure. A measure should have a Cronbach's alpha of at least 0.6 or 0.7 and preferably closer to 0.9 to be considered useful (Aron and Aron, 2002; Sekaran, 2003).The reliability test was done twice, initially when the pilot study was done and subsequently after the data was completely collected. Table 4.2 lists detailed scores of the Cronbach's coefficient alpha.

Table 4.2
Reliability Test Results for the Pilot Study

Variables		Reliability Cronbach's Alpha
Intellectual Capital (IC)	Human Capital (HC)	0.685
	Structural Capital (SC)	0.609
	Relational Capital (RC)	0.675
Knowledge Sharing (KS)		0.829
Innovation (INV)		0.877
Organizational Performance (OP)		0.907

4.9 Data Analysis Plan

To ensure the testability of the study, systematic data analysis was stringently followed throughout the process of data analysis. Various data analysis techniques and procedures to be used in the research for both stages of field research data are listed in Table 4.3 and discussed in the following sub-sections. In this study, the Amos 16.0 software package was used to perform the structural equation modelling (SEM) to investigate the inter-relationships between constructs of the hypothesized model. The SEM is a statistical technique that allows the assessment of the direct and indirect effects of each variable on the other variables (Maruyama, 1998).

Univariate, bivariate and multivariate techniques are used to analyze the data involving descriptive statistics, assumptions for data analysis (i.e. normality, linearity) and quantitative data analysis using Structural Equation Modelling (SEM).

Table 4.3 Data Analysis Techniques

Research Stage	Technique

Survey (Quantitative)	• Descriptive Statistics
	• Check on Assumptions:
	• Test for non-response bias
	• Normality test
	• Test of Collinearity and Linearity
	• Confirmatory Factor Analysis
	  o Assessment of Measurement Models
	  ▪ Construct Validity Assessment
	  ▪ Unidimensionality,
	  ▪ Reliability;
	  ▪ Convergent Validity;
	  ▪ Discriminant Validity;
	  ▪ Nomological/Predictive Validity
	  o Assessment of the Structural Model
	• Testing Hypotheses

First of all, using descriptive statistics, the collected data was summarized, simplified, and organized. Descriptive statistics provide background information for sample characteristics. Background information includes the profiles of the respondents and organizations (gender, role, educational level, number of employees, annual sales turnover, duration of business, business terms). Frequency distributions and percentages provided an overview of the collected data. These were displayed in the form of graphs and tables. Explaining the results of the reliability, normality, and the questionnaire validity follow.

Next, bivariate testing was conducted to test the collinearity and linearity. The issue of multicollinearity (the degree to which the independent variable's effects can be predicted or

accounted for by the other variables in the analysis) was checked using the variance inflating factor (VIF) and tolerance.

Lastly, multivariate testing was used to test the hypotheses on the causal effect relationship. A two-step process is widely used in Structural Equation Modelling (SEM). The first step involves the analysis of the measurement model and the second step tests the structural relationships among the latent constructs. A measurement model relates the items to the latent construct while the structural model relates latent constructs to another. The former provides factor loadings and reliability measures from items to latent constructs. The latter illustrates the path coefficients for significant effects on the relationships between constructs. The overall model in SEM was examined using multiple fit indices. Furthermore, the t-values and the R^2 were also examined for the model fit as well as the other indexes (Hair et al., 2006). Having established an adequate measurement mode, the next step of the two-step procedure involved testing the hypotheses of the study through fitting the structural models for the relations among the latent variables (Bollen, 1989, Kline, 1998, Loehlin, 1998).

4.10 Common Method Variance/ Common Method Bias

As this study adopted self-reported measures, it is exposed to common method variance. Common Method Variance (CMV) is defined as variance that attributable to the measurement method rather than to the constructs the measures represents (Podsakoff et al. 2003). CMV creates a false internal consistency, which are apparent correlation among variables generated by their common resources (Chang et al., 2010). This is especially prevailing when self-reported questionnaires are used to collect data at the same time from

the same participants. Entrepreneurship researchers frequently use the self-reported perceptions of business ownenrs and managers because they are typically quite knowledgeable regarding company strategies and business circumstances (Hambrik, 1981). However, Conway and Lance (2010), self-reports are clearly appropriate for the job performance especially when self-reports can predict organization growth and work context variables (Shalley et al. 2009; Judge et al. 2000) when employees are best suited to self-report creativity because they are the ones who are aware of the subtle things they do in their jobs that make them creative.

The magnitude of common methods bias is likely to be a function of the differences among methods and the concreteness of constructs (Doty and Glick, 1998). Meade et al. (2007) agreed that common method variance and common method bias exist in organizational research but the magnitude of common method bias is likely to be small to medium which do not have the serious consequences of the analysis and negligible (Crampton and Wagner, 1994; Spector (2006). In fact, according to Doty and Glick (1998), the effect of common method bias in organizational research is small as 0.05 or less.

However, the specific details of the research methodology are clearly relevant in determining the likelihood and degree of common method bias. Among the common attributes to CMV are the use of a common rater, the manner in which items are presented to respondents, the context in which questionnaire are placed and the contextual influences used in to measure the constructs (Chang et al., 2010). Podskoff et al. (2003) suggest four remedies to avoid or correct CMV.

1. Using different sources of information for some of the key measures. For example, different sources for dependent and independent variables;

2. Mix the order of questions with different type of scales;
3. Use a complicated specifications of regression models to reduce CMV
4. Use several statistical remedies to detect and control the possibility of CMV.

While remedies 1 and 2 are ex-ante approaches implemented in the research design stage, remedies 3 and 4 are ex-post approaches implemented after the research has been conducted. For this study, researcher has taken carefully steps in avoiding CMV by adopting remedy 1,2,3 and 4 which is ex-ante approach and ex-post approach.

The sources to measure the construct as shown in Table 4.1 are from different sources and to avoid CMV, researcher adapted measures from few different authors. Another ex-ante research strategy is the way questionnaire is designed and administered (remedy 2). For this study, respondents were assured of anonymity and confidentiality of the study. In the questionnaire, respondents would answer questions on behavioural activities (for IC, KS and INV) but in the dependent variable section, it is more towards perception. Moreover, more fact-based questionnaires items are less likely to be associated with CMV (Chang et al., 2010). Although the dependent variable (organizational performance) was self-reported, it was still gathered at a later point in time the predictor variables in order to minimize rating bias (Podsakoff et al. 2003; Luthans et al. 2008). In the questionnaire, respondents would answer questions on behavioural activities (for IC, KS and INV) but in the dependent variable section, it is more towards perception. In addition, researcher developed different scales for demographic section to make it look different than other sections.

There is also empirical evidence arguing for the reliability and validity of self-reported, single respondent data (Lyon et al. 2000; Kumar, et al. 1993). Researcher used statistical tests in attempting to avoid and reduce CMV. One way to rule out the substantial method effects is to demonstrate construct validity of the measures used (Meade et al., 2007) which can be done through; (1) appropriate reliability evidence; (2) Factor structure; (3) Establishment of a nomological network including relationship with theoretically relevant variable; (4) Mean difference between relevant groups; (5) convergent and discriminant validity and other evidences depending on situation (Messick, 1989; as cited in Conway and Lance, 2010)

4.11 Assumptions

In research of this nature, it is important to outline the main assumptions, as ideal situations for such studies do not exist except in controlled environments. The need for clearly pointing out the assumptions receives support from other authors. The assumptions form a basis in the course of conducting this research for the purpose of realizing the research objectives. The nature of the current business environment is strong and dynamic and has been influenced by globalization. Because of this, it is assumed that all firms are experiencing the effects of these trends in the course of conducting their operations. Taking into consideration of Malaysia size, therefore it is assume that small and medium enterprises in Malaysia are exposed to the same challenges and risks.

In line with the above mentioned assumption, it is assumed that all firms implement knowledge sharing and innovation practices (some knowingly and some unknowingly); and are at differing levels of manufacturing levels.

4.11 Summary

This chapter focuses on the methodology used to test the research questions and hypotheses. The philosophy of research as well as the research plan to navigate this study was described. It also described the sampling design of the research. The questionnaire development and the pilot test done to ensure the validity of the research measurement were also explained. Data collection was accomplished through the use of a survey questionnaire. The main techniques to be used in analyzing the data is Structural Equation Modelling as described at the end of the chapter. The next chapter discusses the way the data was collected and analyzed.