# CHAPTER 4

# 4.0 RESEARCH DESIGN AND METHODOLOGY

## 4.1 Introduction

The main purpose of this study is to examine the relationship between supply chain management practices, supply chain integration and supply chain performance belonging to firms in the electronics manufacturing sector in Malaysia. Selection of research design is crucial in deciding the appropriateness of research procedures and methodology to enhance the validity of the study results (Bickman & Rog, 1998). This is made possible by employing rigorous design in data collection from objective sources, and designing studies that have universal "generalizability", whenever possible.

In this chapter, the research design and methodology of the study is presented. This chapter describes the methodology followed in this study. First, this chapter begins with philosophy of the research and a brief explanation on the approach adopted in this study. Subsequently, research design and sample selection are described. Then the theoretical framework is presented and followed by the description of measures of the independent, mediating and the independent variables of study. Later, the methods of testing the hypotheses are described. In addition, explanation on sampling frame and data collection procedure is presented in this chapter. A brief explanation on the questionnaire development is also included. Finally, this chapter will attempt to highlight the methodological framework adopted in this study in-line with its research questions and research objectives.

## 4.2 Philosophy Background

This section discusses the main philosophical issues considered when preparing and commencing the present research. Like every human action, the research is grounded on a philosophical perspective, implicitly or explicitly. To ignore the philosophical issue, while not necessarily fatal, can seriously affect the quality of research (Cresswell, 1998). Understanding the philosophical positioning of research is particularly useful in helping researchers clarify alternative designs and methods for a particular piece of research, and identifying which one is more likely to work in practice (Easterby-Smith & Richard, 1991).

### 4.2.1 Philosophy of Research Orientation

There are two main research orientation approaches namely, positivist research (quantitative), and interpretive research (phenomenological or qualitative approach) (Williams, 2008). The positivist approach, often designated as quantitative research, believes that the subject under analysis should be measured through objective methods rather than being inferred subjectively through sensation, reflection or intuition (Remenyi, Williams, Money, & Swartz, 1998). In addition, positivism searches for causal explanations and fundamental laws and generally reduces the whole to the simplest possible elements in order to facilitate analysis (Bryman, 1988).

Besides, the interpretative approach, understands reality as holistic, and socially constructed, rather than objectively determined (Easterby-Smith & Richard, 1991). As such, the researcher should not gather facts or simply measure how often certain patterns occur, but rather appreciate the different construction and meaning people place upon their own experiences and the reasons for these differences (Davidson, 1995). Hence, interpretative

approach tries to understand and explain a phenomenon, rather than search for external causes or fundamental laws (Remenyi, et al., 1998). However, according to William (2008), neither the positivistic view nor the interpretive are adequate in covering all forms of knowledge and information as they are dependent on the framework of the research.

### 4.2.2 Approach adopted in this study

Based on the above phenomena, the philosophical approach underlying this thesis is positivist approach. Positivist approach is appropriate because this study attempts to understand the organizations practices by applying hypothetical-deductive method over simplifies reality and usually strips out complicating factors that could be important to construction practitioners (Remenyi, et al., 1998).

Accordingly, this study is applying theory from operations management, where researchers applied positivist approach and usually tried to follow a hypothetical-deductive method, proceeding in a logical step-by-step fashion (B. B. Flynn, Sakakibara, Schroeder, Bates, & Flynn, 1990; Pannirselvam, Ferguson, Ash, & Siferd, 1999; Scudder & Hill, 1998). Other researchers such as Babbie (1992), Bailey (1987) and Best (1989) support the virtues of empirical research. However, McGrath (1982) in his study of research choices makes it clear that there are no ideal solutions, only a series of compromises. Patton (1990) expresses the same view that research, like diplomacy, is the art of the possible and Yin (2003) said that the research methodology should be chosen as a function of the research situation.

## 4.3 Research Design

This study is conducted according to the steps outlined in Figure 4.1, which depicts the research process flow chart.

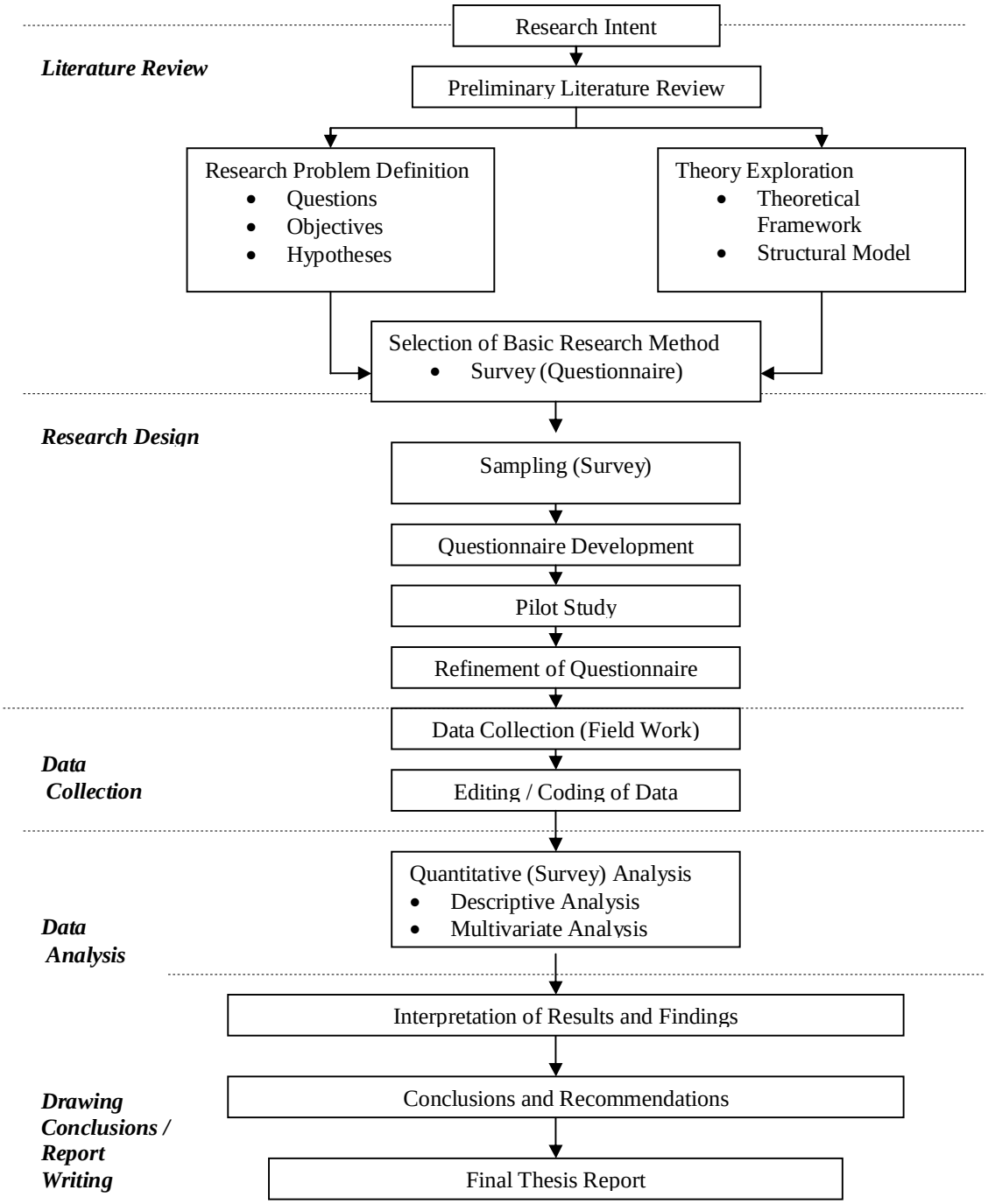


**Figure 4.1**
**Research Process Flow Chart**

Based on the above research process, the research begins with review of literature, implementation of research methods, data collection, analyzing the collected data with appropriate statistical application, drawing up the conclusion and report writing. The aim of this research design is to examine the relationship between supply chain practices, supply chain integration and supply chain performance. Additionally, it has also examined the mediating role of supply chain integration in the relationship between supply chain practices and supply chain performance. The independent variable of supply chain practices was operationalised by eight dimensions which include supplier strategic partnering, customer relationship, information sharing, information quality, internal lean practices, postponement, agreed vision & goals and risk & reward sharing. Meanwhile, supply chain performance was operationalised by three dimensions namely resources performance (RP), output performance (OP) and flexibility performance (FP). The mediating variable is a single dimension with 5 items of measurement.

## 4.4 Research Framework

A theoretical framework is a conceptual model of how one theorizes or makes logical sense of the relationships among the several factors that have been identified as important to address the research problem (Malhotra, 2007). In sum, the theoretical framework discusses the interrelationships among the variables that are deemed to be integral to the dynamics of the situation under investigation. Developing such a conceptual framework enables researcher to postulate or hypothesize and test certain relationships. Henceforth, this will improve and enhance the understanding of the dynamics of the situation (Sekaran, 2003). The entire research rests on the basis of the theoretical framework. Since the theoretical framework offers the conceptual foundation to proceed with the research, and since a

theoretical framework is none other than identifying the network of relationships among the variables considered important to the study of any given problem situation, it is essential to understand what a variable means in this study.

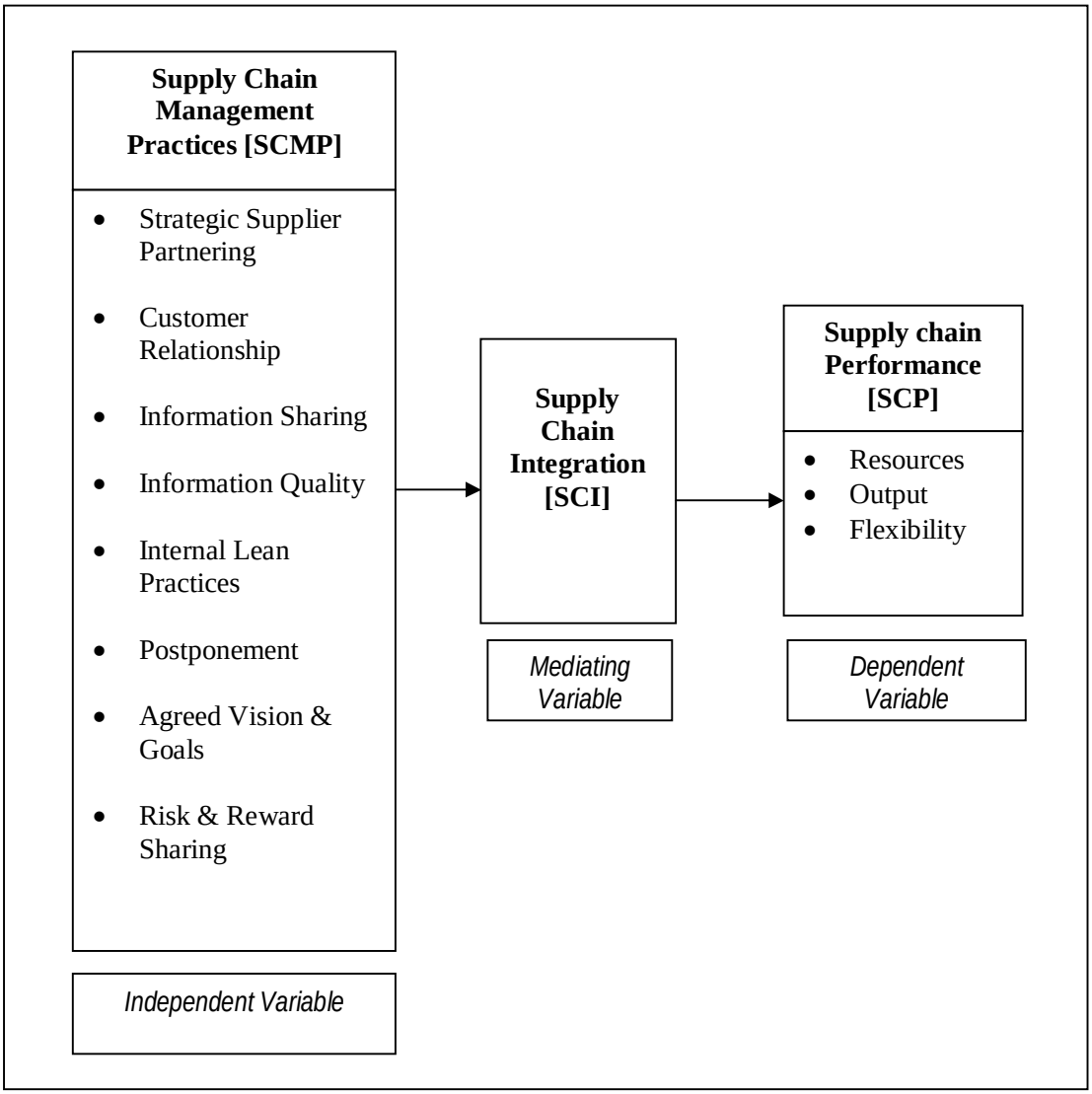


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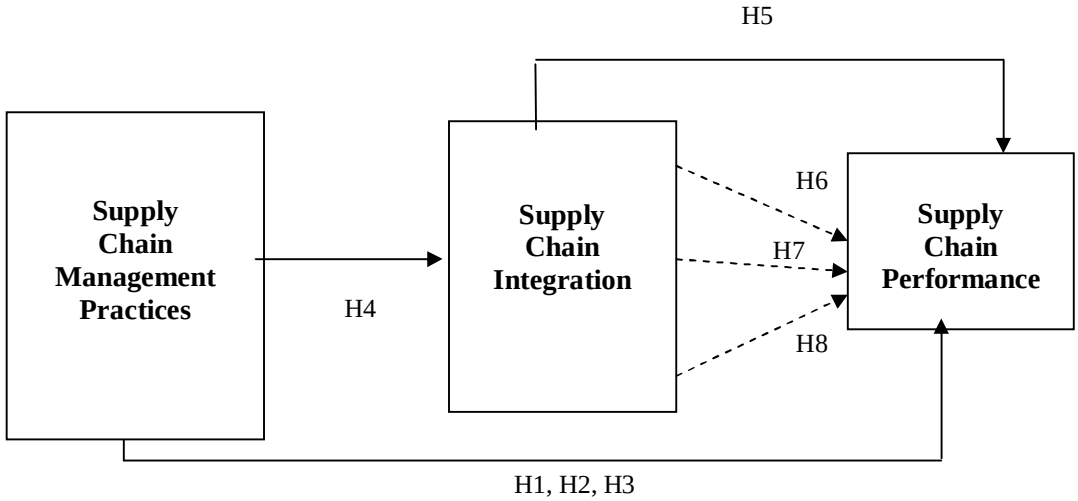
**Figure 4.2**
**Theoretical Framework**

Figure 4.2 presents the proposed theoretical framework. The framework for this research results from relationships deduced from the review of literature, observing that different authors use varying approaches to study similar sets of variables, and vice versa. The framework for this research proposes that supply chain management practices (SCMP) will have an impact on the supply chain integration and in turn will influence supply chain performance (SCP). Then again, the framework also proposes that supply chain integration will have a mediating effect on the overall relationship between supply chain management practices and supply chain performance.

In the literature some authors posit the existence of the direct relationships among supply chain management practices, supply chain integration and overall supply chain performance (Armistead & Mapes, 1993; Azar, et al., 2008; Baharanchi, 2009) . The framework also proposes that supply chain management practices, supply chain integration (SCI) and supply chain performance are closely associated. This theoretical framework delineates relationship between three main variables with several dimensions in two categories: (1) direct relationship (see Figure 4.3) and (2) indirect relationship (see Table 4.3).

## 4.5 Hypothesized Research Model

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**Note:**

***Direct effect:***
⟶ *represents direct effects: Supply Chain Management Practices on Supply Chain Integration, Supply Chain Management Practices on Supply Chain Performance.*

***Indirect effect:***
- - - - ▶ *represents mediating effect: Supply Chain Management Practices on Supply Chain Performance through Supply Chain Integration (analysis using hierarchical regression considering supply chain integration as mediating variables)*

**Figure 4.3**
**The Hypothesized Research Model**

Figure 4.3 presents the proposed structural framework. The structural framework identifies the direct relationship and the indirect relationship among the three variables which is supply chain management practices (Independent variable), supply chain integration (mediating variable) and supply chain performance (dependent variable). As such the structural framework highlighted the eight main hypotheses which are relevant to this study. The framework for this research proposes that supply chain management practices (SCMP)

will have an impact on the supply chain integration and in turn will influence supply chain performance (SCP). The framework also proposes that supply chain management practices, supply chain integration (SCI) and supply chain performance are closely associated. This structural framework delineates relationship between three main variables and eleven dimensions in two categories: (1) direct relationship (see Tables 4.10, 4.11, 4.12, 4.13 and 4.14 ) and (2) indirect relationship (see Tables 4.15, 4.16 and 4.17).

**Table 4.1**
**Direct Relationship – Hypothesis 1**

| Hypothesis | Direct Relation |
|---|---|
| **Main Hypothesis [H1]** | **The relationship between SCMP and Resources Performance [RP]** |
| *H1a* | *The relationship between SSP and Resources Performance* |
| *H1b* | *The relationship between CR and Resources Performance* |
| *H1c* | *The relationship between IS and Resources Performance* |
| *H1d* | *The relationship between IQ and Resources Performance* |
| *H1e* | *The relationship between ILP and Resources Performance* |
| *H1f* | *The relationship between PSNT and Resources Performance* |
| *H1g* | *The relationship between VISN and Resources Performance* |
| *H1h* | *The relationship between RISK and Resources Performance* |

Table 4.1 depicts the direct relationship between the eight dimensions of supply chain management practices (independent variable) and resources performance, which is one of the dimensions in supply chain performance (dependent variable).

**Table 4.2**
**Direct Relationship – Hypothesis 2**

| Hypothesis | Direct Relation |
|---|---|
| **Main Hypothesis [H2]** | **The relationship between SCMP and Output Performance [OP]** |
| *H2a* | *The relationship between SSP and Output Performance* |
| *H2b* | *The relationship between CR and Output Performance* |
| *H2c* | *The relationship between IS and Output Performance* |
| *H2d* | *The relationship between IQ and Output Performance* |
| *H2e* | *The relationship between ILP and Output Performance* |
| *H2f* | *The relationship between PSNT and Output Performance* |
| *H2g* | *The relationship between VISN and Output Performance* |
| *H2h* | *The relationship between RISK and Output Performance* |

Table 4.2 depicts the direct relationship between the eight dimensions of supply chain management practices (independent variable) and output performance, which is one of the dimensions in supply chain performance (dependent variable).

**Table 4.3**
**Direct Relationship – Hypothesis 3**

| Hypothesis | Direct Relation |
|---|---|
| **Main Hypothesis [H3]** | **The relationship between SCMP and Flexibility Performance [FP]** |
| *H3a* | *The relationship between SSP and Flexibility Performance* |
| *H3b* | *The relationship between CR and Flexibility Performance* |
| *H3c* | *The relationship between IS and Flexibility Performance* |
| *H3d* | *The relationship between IQ and Flexibility Performance* |
| *H3e* | *The relationship between ILP and Flexibility Performance* |
| *H3f* | *The relationship between PSNT and Flexibility Performance* |
| *H3g* | *The relationship between VISN and Flexibility Performance* |
| *H3h* | *The relationship between RISK and Flexibility Performance* |

Table 4.3 depicts the direct relationship between the eight dimensions of supply chain management practices (independent variable) and flexibility performance, which is one of the dimensions in supply chain performance (dependent variable).

**Table 4.4**
**Direct Relationship – Hypothesis 4**

| Hypothesis | Direct Relation |
|---|---|
| **Main Hypothesis [H4]** | **The relationship between SCMP and SCI** |
| *H4a* | *The relationship between SSP and SCI* |
| *H4b* | *The relationship between CR and SCI* |
| *H4c* | *The relationship between IS and SCI* |
| *H4d* | *The relationship between IQ and SCI* |
| *H4e* | *The relationship between ILP and SCI* |
| *H4f* | *The relationship between PSNT and SCI* |
| *H4g* | *The relationship between VISN and SCI* |
| *H4h* | *The relationship between RISK and SCI* |

Table 4.4 depicts the direct relationship between the eight dimensions of supply chain management practices (independent variable) and supply chain integration, which is the mediating variable.

**Table 4.5**
**Direct Relationship – Hypothesis 5**

| Hypothesis | Direct Relation |
|---|---|
| **Main Hypothesis [H5]** | **The relationship between SCI and Supply Chain Performance [SCP]** |
| *H5a* | *The relationship between SCI and Resources Performance* |
| *H5b* | *The relationship between SCI and Output Performance* |
| *H5c* | *The relationship between SCI and Flexibility Performance* |

Table 4.5 depicts the direct relationship between the supply chain integration (mediating variable) and three dimensions of supply chain performance (independent variable).

**Table 4.6**
**Indirect Relationship – Hypothesis 6**

| Hypothesis | Indirect Relation |
|---|---|
| **Main Hypothesis [H6]** | **SCI mediates the relationship between SCMP and RP** |
| *H6a* | *SCI mediates the relationship between SSP and RP* |
| *H6b* | *SCI mediates the relationship between CR and RP* |
| *H6c* | *SCI mediates the relationship between IS and RP* |
| *H6d* | *SCI mediates the relationship between IQ and RP* |
| *H6e* | *SCI mediates the relationship between ILP and RP* |
| *H6f* | *SCI mediates the relationship between PSNT and RP* |
| *H6g* | *SCI mediates the relationship between VISN and RP* |
| *H6h* | *SCI mediates the relationship between RISK and RP* |

Table 4.6 depicts the indirect relationship between the eight dimensions of supply chain management practices (independent variable) and resource performance, which is one of the dimensions in supply chain performance (dependent variable). The above indirect relationship proposes that supply chain integration mediates the relationship between the dimensions of supply chain management practices and supply chain performance.

**Table 4.7**
**Indirect Relationship – Hypothesis 7**

| Hypothesis | Indirect Relation |
|---|---|
| **Main Hypothesis [H7]** | **SCI mediates the relationship between SCMP and OP** |
| *H7a* | *SCI mediates the relationship between SSP and OP* |
| *H7b* | *SCI mediates the relationship between CR and OP* |
| *H7c* | *SCI mediates the relationship between IS and OP* |
| *H7d* | *SCI mediates the relationship between IQ and OP* |
| *H7e* | *SCI mediates the relationship between ILP and OP* |
| *H7f* | *SCI mediates the relationship between PSNT and OP* |
| *H7g* | *SCI mediates the relationship between VISN and OP* |
| *H7h* | *SCI mediates the relationship between RISK and OP* |

Table 4.7 depicts the indirect relationship between the eight dimensions of supply chain management practices (independent variable) and output performance, which is one of the dimensions in supply chain performance (dependent variable). The above indirect

relationship proposes that supply chain integration mediates the relationship between the dimensions of supply chain management practices and supply chain performance.

**Table 4.8**
**Indirect Relationship – Hypothesis 8**

| Hypothesis | Indirect Relation |
|---|---|
| **Main Hypothesis [H8]** | **SCI mediates the relationship between SCMP and FP** |
| *H8a* | *SCI mediates the relationship between SSP and FP* |
| *H8b* | *SCI mediates the relationship between CR and FP* |
| *H8c* | *SCI mediates the relationship between IS and FP* |
| *H8d* | *SCI mediates the relationship between IQ and FP* |
| *H8e* | *SCI mediates the relationship between ILP and FP* |
| *H8f* | *SCI mediates the relationship between PSNT and FP* |
| *H8g* | *SCI mediates the relationship between VISN and FP* |
| *H8h* | *SCI mediates the relationship between RISK and FP* |

Table 4.8 depicts the indirect relationship between the eight dimensions of supply chain management practices (independent variable) and flexibility performance, which is one of the dimensions in supply chain performance (dependent variable). The above indirect relationship proposes that supply chain integration mediates the relationship between the dimensions of supply chain management practices and supply chain performance.

## 4.6 Hypotheses Development

This section formulates and develops the relevant hypotheses for the research. Specifically, the hypotheses postulated to answer the research questions in the study. These hypotheses are classified based on the direct and indirect relationship between three main variables such as the independent variable [eight supply chain management practices dimension], mediating variable [supply chain integration] and dependent variables [supply chain practices]. There are four main relationships to be tested:

i.] Supply Chain Management Practices and Supply Chain Performance.

ii] Supply Chain Management Practices and Supply Chain Integration.

iii] Supply Chain Integration and Supply Chain Performance.

iv] Supply Chain Management Practices and Supply Chain Performance, mediated by Supply Chain Integration.

In this study, the supply chain practice has eight (8) dimensions - supplier strategic partnering, customer relationship, information sharing, information quality, internal lean practices, postponement, agreed vision & goals and risk & reward sharing. All these practices we considered as initiatives, effort and resources of an organisation. In addition, supply chain practices have three dimensions namely resources, output and flexibility. Hence, this current study uses findings relevant to these variables to examine the link between supply chain practices, supply chain integration and supply chain performance. The proposed eight [8] main hypotheses are:

H1: Supply chain management practices are significantly related to supply chain resource performance.

H2: Supply chain management practices are significantly related to supply chain output performance.

H3: Supply chain management practices are significantly related to supply chain flexibility performance.

H4: Supply chain management practices are significantly related to supply chain integration.

H5: Supply chain integration is significantly related to supply chain performance.

H6 Supply chain integration will mediate the relationship between supply chain practices and supply chain resource performance.

H7 Supply chain integration will mediate the relationship between supply chain practices and supply chain flexibility performance.

H8 Supply chain integration will mediate the relationship between supply chain practices and supply chain output performance.

### 4.6.1 Supply Chain Management Practices [SCMP] and Supply Chain Performance [SCP].

SCMP can been defined as the set of activities performed by an organisation in order to promote effective management in terms of its supply chain (Azman & Suhaiza, 2011). Pioneering research conducted by Donlon, (1996) describes the SCMP to include supplier partnership, outsourcing, cycle time compression, and continuous process flow and information technology sharing. Tan et al., (1998) empirically assessed the inclusion of purchasing, quality, and customer relations dimensions to represent SCM practices. Tan, (2001) also recommended that SCMP to include the flow of materials and information, postponement strategy and mass customization. Similarly, Tan, (2002) identified six other dimensions of SCMP through factor analysis namely supply chain integration, information sharing, supply chain characteristics, customer service management, geographical proximity and just-in-time (JIT) capability. Chen and Paulraj, (2004) used supplier base reduction, long-term relationship, communication, cross-functional teams and supplier involvement to measure SCMP.

In addition, Min and Mentzer, (2004) identify the concept SCMP through system approach which includes dimensions such as agreed vision and goals, information sharing, risk and reward sharing, cooperation, process integration, long-term relationship and agreed supply chain leadership. Subsequently, realizing the importance of the SCMP, Li et al., (2005) conceptualized, developed, and validated six dimensions (strategic supplier partnership, customer relationship, information sharing, information quality, internal lean practices, and postponement) of SCMP and conducted a test on its relationship with firms competitive advantage and performance (Li, Ragu-Nathan, et al., 2006). In the effort of consolidating the literature, two important concepts are identified to develop the new proposed comprehensive model of SCMP which will be able to structure complete multi-dimensional practices, comprising eight constructs. The eight construct constitutes a combination of comprehensive model (Li, Ragu-Nathan, et al., 2006; Li, et al., 2005) and system approach model (Min & Mentzer, 2004). Specifically, the proposed SCMP in this study will cover these important dimensions such as upstream (strategic supplier partnership) and downstream (customer relationship) sides. Further, it includes information flow across a supply chain (information sharing and information quality), and internal supply chain processes (postponement and internal lean practices), In addition it also includes system approach (Min & Mentzer, 2004) which constitutes agreed vision & goals and risk & award sharing. Therefore, in line with these prior studies, this study hypothesized that:

H1: Supply chain management practices are significantly related to supply chain resource performance.

H2: Supply chain management practices are significantly related to supply chain output performance.

H3: Supply chain management practices are significantly related to supply chain flexibility performance.

### 4.6.2 The Relationship between Supply Chain Management Practices and Supply Chain Integration

The hypotheses deal with the linkages between the supply chain management practices adopted by electronics manufacturers in Malaysia and their supply chain integration. As previously noted, supply chain management practices have been widely cited as a means to seek external collaboration with various business processes along with the supply chain in order to achieve superior supply chain integration (Donk, Akkerman, & Vaart, 2008; Fawcett & Magnan, 2002) and subsequently improve the firms' performance (Handfield, Petersen, Cousins, & Lawson, 2009; Li, et al., 2009), especially for firms competing in very dynamic markets (Bernardes, 2010). There are a considerable number of empirical studies, as well as theoretical studies, supporting the link between supply chain practices and supply chain integration. Studies by Kim, (2006b); Power, (2005) and Vachon & Klassen, (2006) empirically examined the direct effect of supply chain practices on supply chain integration. The literature has also suggested the theoretical relationship between supply chain practices and supply chain integration (Exon-Taylor, 1996; Samaranayake, 2005; Trkman, Stemberger, Jaklic, & Groznik, 2007). Findings have proven that there is a direct relationship between the seven dimensions of supply chain practices and supply chain integration. These studies provide initial support for the existence of the relationship between supply chain practices and supply chain integration. In general, the study hypothesizes that supply chain practices have direct effects on supply chain integration.

According to the theoretical framework presented in Figure 4.2, the research proposes the following hypothesis:

H4: Supply chain management practices are significantly related to supply chain integration.

### 4.6.3 The Relationship between Supply Chain Integration and Supply Chain Performance

This third set of hypotheses deals with the relationship of supply chain integration and the supply chain performance. In this study, supply chain integration [SCI] is defined as the extent to which all activities within an organisation, and the activities of its suppliers, customers, and other supply chain members, are integrated together (Narasimhan & Kim, 2002; Rai, et al., 2006; Stonebraker & Liao, 2006). Hence, supply chain integration is regarded as collaboration between various value chain entities to achieve seamless flow of products and information from supplier on to customer (Donk, et al., 2008). The link between supply chain integration and supply chain performance is well established in the literature. Supply chain integration links a firm with its customers, suppliers, and other channel members by integrating their relationships, activities, functions, processes and locations (S. W. Kim & Narasimhan, 2002). Supply chain integration includes two stages namely, internal integration between functions and external integration with trading partners. Internal integration establishes close relationships between functions such as shipping and inventory or purchasing and raw material management (Trkman & Groznik, 2006). Meanwhile, external integration has two directions which are, forward integration for physical flow of deliveries between suppliers, manufacturers, and customers as well as

backward coordination of information technologies and the flow of data from customers, to manufacturers, to suppliers (Frohlich & Westbrook, 2001). Based on this discussion, several measurement items were selected and adopted (Sezen, 2008) to measure SCI. There are empirical studies as well as theoretical studies supporting the association between integration and performance in the context of supply chain management.

There are also numerous studies suggesting the introduction of supply chain integration mechanism to improve the flow of goods and information in across and within supply chain (Exon-Taylor, 1996; Koufteros, et al., 2005; Lee, Kwon, & Severance, 2007). This implies that, supply chain integration is one of the possible tools to enhance the competitiveness of firms and delivery of performance. In the similar way, such effort is able to improve the supply chain performance. Thus, the following hypothesis has been developed:

H5: Supply chain integration is significantly related to supply chain performance.

### 4.6.4 The Relationship between Supply Chain Management Practices, Supply Chain Integration and Supply Chain Performance

The fourth set of hypotheses deals with the total effects of supply chain practices and integration on the performance. In addition to the direct effect, supply chain management practices also indirectly affect performance through construct of supply chain integration. The total effect is simply the sum of the direct effects and all the indirect effects that occur through intervening variables. This study expected there to be an indirect path from the dimensions of supply chain practices to supply chain performance. The indirect effects of

supply chain management practices on supply chain performance through supply chain integration have never been tested theoretically and empirically by previous studies.

The preceding hypotheses link the relationships among supply chain practices, supply chain integration and supply chain performance. Implicitly, the discussion suggests that supply chain practices affect supply chain performance through their capacities in supply chain integration. Firms in the electronics industry can use a set of supply chain practices to promote the integration of various firms in the supply chain (Kim, 2006a; Li, Ragu-Nathan, et al., 2006; Pramatari, 2007), which, in turn, enhance their supply chain performance (Baharanchi, 2009; Fabbe-Costes & Jahre, 2007; Gimenez & Ventura, 2005). Thus, this study argues that supply chain integration plays a mediating role in the relationship between supply chain management practices (independent variables) and supply chain performance (dependent variable). Following this line of reasoning, this study proposes the following hypotheses for the indirect effects of supply chain practices on supply chain performance through the effect of supply chain integration:

H6 Supply chain integration will mediate the relationship between supply chain practices and supply chain resource performance.

H7 Supply chain integration will mediate the relationship between supply chain practices and supply chain output performance.

H8 Supply chain integration will mediate the relationship between supply chain practices and supply chain flexibility performance.

## 4.7 Sample and Sampling Procedures

Consistent with the purpose of this study, electronics manufacturing firms will be the population sample of this study. The primary respondents of the study are the managers in the operational, logistics or supply chain department. However, although increasing, not many firms have supply chain managers. In Malaysia, for many firms, supply chain management is still a broadly accepted concept that oversees procurement and logistics activities as a whole for effective collaboration across members in the upstream supply chain and downstream supply chain. A number of large firms use the title, supply chain managers, for those managers who supervise all the channel relationships from the firm's strategic point of view. In the absence of that position, respondents will be logistics managers. Hence, the key respondent for this study is high ranking mangers of supply chain and logistics. However, if there are firms with no managers in such designation (supply chain manager or logistics manager), then the survey seeks response from high ranking or top-level managers from other functions who has the requisite knowledge and well acquainted with most of the required information regarding the survey.

The choice to use the single respondent approach was based on (1) various firm sizes as well as the (2) respondent's familiarity with the research topic and the information sought (Alvonitis & Salavou, 2007). There are advantages to use a single informant. There is a high likelihood that the most knowledgeable individual in the organisation would provide the information and the view of the respondent that may reflect those of the firm. Besides, the use of a single respondent also helps to increase the participation of more firms since only one individual in the organisation is involved (Ngah, 2011). Thus, research using

single-respondent self-reports can be appropriate and necessary means of operationalzing key construct when vigilantly performed (Chandler & Hanks, 1993).

The sampling frame of this study consists of major firms with supply chain manager, or a logistics manager from electronics manufacturing firms in Malaysia. The sampling frame is obtained from the Department of Statistics Malaysia. This sampling frame summarizes the sample characteristics for each state according to industry type and size. The diversity of the sample should strengthen the external validity of this study results (Kim, 2006b).

The study used simple random sampling method in selecting respondents. This selection was carried out using random numbers table (Babbie, 2004 ). The simple random sampling was deemed appropriate because of the small number of electronics firms available in each category of classification (Abdullah, Uli, & Tarı, 2008). The minimum size requirement was based on the ration of the number of variables and observation 1:5 (Hair, Anderson, Tatham, & Black, 1995). Based on this requirement, the minimum number of respondents was 60 samples (12 variables x 5). Adding to this, Roscoe, (1975) proposed the following rules of thumb for determining sample size which concludes sample size larger than 30 and less than 500 is appropriate for most research.

## 4.8 Questionnaire Development

Questionnaires are widely used for data collection in social science research, particularly in surveys. It is a fairly reliable tool for gathering data for large diverse, varied and scattered sample unit or sample group. It is used in obtaining objective and quantitative data as well as in gathering information of a qualitative nature of research. According to Shajahan, (2005) p. 133,

> *"a questionnaire is a list of question sent to number of person for their answers and which obtains standardized result that can be tabulated and treated statistically". Questionnaire is also a device for securing answer to questions by using a form that the respondent fills in himself.*

### 4.8.1 Survey Questionnaire Design

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 (Veera & Chandran, 2010). The questionnaire consists of four sections. The first section covers supply chain management practices (SCMP); second section is on supply chain integration (SCI); third section is about supply chain performance (SCP) and the fourth section is on the demographic profile. The demographic profile is divided into four categories. Firm respondents were required to provide information on their demographic organization profile, such as, (1) types of business, (2) number of employees, (3) annual sales turnover and (4) years of firm's operating experience.

In the variable sections (supply chain management practices, supply chain integration and supply chain performance), all questions are closed-ended questions. Supply chain management practices is divided into eight dimensions, namely, strategic supplier

partnership (SSP) – 10 items, customer relationship management (CRM) – 8 items, information sharing (IS) – 7 items, information quality (IQ) – 5 items, internal lean practices (ILP) – 5 items, postponement (PST) – 5 items, agreed vision & goals(VISN) – 4 items and risk & reward sharing (RISK) – 3 items. For supply chain integration (SCI) there are 5 items. Finally, supply chain performance is divided into three dimensions, namely, supply chain flexibility performance (FP) – 5 items, supply chain resource performance (RP) – 5 items and supply chain output performance (OP) – 7 items. The full set of these measurement items and questionnaire are found in appendix 1, which presents the survey questionnaire (final version).

### 4.8.2 Survey Questionnaire Validation

This study used a three-step approach in order to develop the questionnaire. First, the researcher developed a draft questionnaire using a detailed literature survey. This study also interviewed three managers from mainly electronics manufacturing firms in Malaysia. Through these interviews, the questionnaires were further scrutinized to ensure its appropriateness to electronics manufacturing firms in Malaysia.

Second, in the attempt to validate the questionnaires, a random selection of two logistics/ supply chain managers of electronics manufacturing firms in Malaysia were approached. Later, they were mailed a draft form of the survey questionnaire and they were asked to identify the scale items, which they considered either awkward and/or not applicable. They evaluated every scale item for content and meaningfulness. Although the researcher did not need to add new items, he modified some scale items based on the feedback received. In addition, the study also conducted follow-up telephone interviews with some of the

managers to verify the relevance and clarity of the survey questions. Third, two academics were contacted and asked for their comments on the utility of the scale items. As such this study made some further revisions to the questionnaire as a result of their comments.

### 4.9 Data Collection Procedure

Data collection is part of research process which concerned collecting data from the right target population at the right time in order to answer the research questions and to meet the objectives of research (Bickman & Rog, 1998; Bryman, 1988). In qualitative research, various types of instruments are used to collect data. These include achievement tests, examination scores, questionnaires, observation and checklist (Veera & Chandran, 2010) . Therefore selecting the appropriate data collection method and procedure ensures effective, efficient and accurate data collection process throughout the study (Shajahan, 2005).

This study will use written survey questionnaire as the methodology for data collection. Particularly, questionnaire survey will be deployed as its primary means of data collection. Data will be collected nationwide throughout Malaysia. The unit of analysis is the manufacturing firms in electronics industry, which is regarded as the focal firm in the electronics supply chain. Similarity exists in selecting the firm as a unit of analysis in previous studies as well (Wong, Qi, & Leung, 2009; Yusuff, 2004; Zsidisin, Jun, & Adams, 2000).

### 4.10 Measurement Instrument

In developing measures, the current study adapted scales from the previous literature wherever possible. The process of adopting and adapting measurement scale in this study is as follows: Firstly, literature was searched to locate any relevant measures available for the

current study based on the objectives of research and the definition of construct. Secondly, existing scales were adopted into the study wherever possible, and no new scales were developed as it is not necessary for this study. Multiple items were used for each construct to increase reliability. Finally, the developed instrument had been examined and purified by experienced academic researcher in SCM before it was pre-tested with several corporate managers to enhance the quality of instrument and adequacy of the items used in the scales. A brief description of each construct is discussed below.

### 4.10.1 Supply Chain Management Practices

Supply Chain Management Practices assess the extent of activities undertaken by an organisation to promote effective management of its supply chain (Li, et al., 2005). According to Li et al., (2005) supply chain practice comprises a set of activities namely, Internal Lean Practices, Strategic Supplier Partnership, Information Sharing, Customer Relationship Management, Information Quality, and Postponement. Whereas, Min & Mentzer (2004), defined supply chain practices with a different set of activities which includes agreed vision & goals, Information Sharing, Risk & Reward Sharing, Cooperation, Process Integration, Long-term Relationship and Agreed Supply Chain Leadership. In reviewing and consolidating these two literatures, two important concepts are identified to develop a more comprehensive supply chain management practices which will be able to structure complete multi dimensional practices, comprising eight constructs. The eight construct constitutes a combination of comprehensive model (Li, Ragu-Nathan, et al., 2006; Li, et al., 2005) and system approach model (Min & Mentzer, 2004). In line with the literature, the proposed new set of supply chain management practices in this study will cover several dimensions Strategic Supplier Partnership, Information Sharing, Customer

Relationship Management, Information Quality, Internal Lean Practices, Postponement, Agreed Vision & Goals and Risk & Reward Sharing,

#### 4.10.1.1 Strategic Supplier Partnership [SSP]

The existing approach to the measurement of dimension includes Strategic Supplier Partnership that can be itemized into ten elements, beginning with quantity of dependable suppliers, quality of suppliers, supplier selection criteria, supplier relationship, joint problem-solving approach, quality improvement programme, continuous improvement programme, planning and goal-setting activities, new product development programme and supplier certification.

**Table 4.9**
**Measurement Items for Strategic Supplier Partnership**
**of**
**Supply Chain Management Practices**

| Dimension of Supply Chain Management Practices | Measurement Items | Source |
|---|---|---|
| Strategic Supplier Partnership [SSP] | Rely on few dependable suppliers (SSP1 | Li et al. (2005) |
| | Rely on few high quality suppliers (SSP2) | Li et al. (2005) |
| | Consider quality as number one criterion in selecting suppliers (SSP3) | Li et al. (2005; 2006) |
| | Establish long term relationship with suppliers (SSP4) | Li et al. (2005) |
| | Regularly solve problems jointly with suppliers (SSP5) | Li et al. (2005; 2006) |
| | Helps its suppliers to improve their product quality (SSP6) | Li et al. (2005; 2006) |
| | Continuous improvement programs that include its key suppliers (SSP7) | Li et al. (2005; 2006); Min and Mentzer, (2004) |
| | Includes key suppliers in its planning and goal setting activities (SSP8) | Li et al. (2005; 2006); Min |
| | Involves key suppliers in new product development processes (SSP9) | Li et al. (2005; 2006); Min and Mentzer, (2004) |
| | Certifies suppliers for quality (SSP10) | Li et al. (2005) |

#### 4.10.1.2 Customer Relationship Management [CRM]

The methods of measuring the dimension, Customer Relationship Management that can be itemized into eight elements, beginning with fair play with customer, seek customer feedback, evaluate customer satisfaction, determine customer expectation, customer interaction, facilitate customer service assistance, evaluate customer complaint and evaluate customer relationship.

**Table 4.10**
**Measurement Items for Customer Relationship Management**
**of**
**Supply Chain Management Practices**

| Dimension of Supply Chain Management Practices | Measurement Items | Source |
|---|---|---|
| Customer Relationship Management [CRM] | Shares a sense of fair play with its customers (CRM1) | Li et al. (2005); Tan et al. (1999) |
| | Interacts with customers to set its reliability, responsiveness, and other standards (CRM2) | Wisner (2003); Li et al. (2005; 2006); Tan et al. (1999) |
| | Frequent follow-up with its customers for quality/service feedback (CRM3) | Li et al. (2005); Tan et al. (1999) |
| | Frequently measures and evaluates customer satisfaction (CRM4) | Li et al. (2005; 2006); Tan et al. (1999) |
| | Frequently determine future customer expectations (CRM5) | Wisner (2003); Li et al. (2005; 2006); Tan et al. (1999) |
| | Facilitates customers' ability to seek assistance from it (CRM6) | Wisner (2003); Li et al. (2005; 2006); Tan et al. (1999) |
| | Frequently evaluates the formal and informal complaints of its customers (CRM7) | Li et al. (2005) |
| | Periodically evaluates the importance of its relationship with its customers (CRM8) | Li et al. (2005; 2006) |

#### 4.10.1.3 Information Sharing [IS]

The methods of measuring dimension, Information Sharing that can be itemized into seven elements, beginning with share proprietary information, inform changing needs, trading partner share proprietary information, trading partner share business issues, trading partner share business process knowledge, trading partner share business planning information and trading partner share information effecting other partners.

**Table 4.11**
**Measurement Items for Information Sharing**
**of**
**Supply Chain Management Practices**

| Dimension of Supply Chain Management Practices | Measurement Items | Source |
|---|---|---|
| Information Sharing [IS] | Shares business units' proprietary information with its trading partners (IS1) | Li et al. (2005) |
| | Informs trading partners in advance of changing needs (IS2) | Li et al. (2005) |
| | Trading partners share proprietary information (IS3) | Li et al. (2005; 2006) |
| | Trading partners keep fully informed about issues that affect its business (IS4) | Li et al. (2005; 2006); Min and Mentzer, (2004) |
| | Trading partners share business knowledge of core business processes with your organisation (IS5) | Li et al. (2005; 2006) |
| | Trading partners exchange information that helps establishment of business planning (IS6) | Li et al. (2005; 2006) |
| | Trading partners keep each other informed about events or changes that may affect the other partners (IS7) | Li et al. (2005; 2006) |

#### 4.10.1.4 Information Quality [IQ]

The methods of measuring dimension, Information Quality that can be itemized into five elements, beginning with timely information exchange among members of supply chain or trading partners, accurate information exchange among members of supply chain or trading partners, complete information exchange among members of supply chain or trading partners, adequate information exchange among members of supply chain or trading partners and reliable information exchange among members of supply chain or trading partners.

**Table 4.12**
**Measurement Items for Information Quality**
**of**
**Supply Chain Management Practices**

| Dimension of Supply Chain Management Practices | Measurement Items | Source |
|---|---|---|
| Information Quality [IQ] | Information exchange is timely (IQ1) | Li et al. (2005; 2006) |
| | Information exchange is accurate (IQ2) | Li et al. (2005; 2006) |
| | Information exchange is complete (IQ3) | Li et al. (2005; 2006) |
| | Information exchange is adequate (IQ4) | Li et al. (2005; 2006) |
| | Information exchange is reliable (IQ5) | Li et al. (2005; 2006) |

#### 4.10.1.5 Postponement [PST]

The methods of measuring dimension, Postponement that can be itemized into five elements, beginning with product design for modularity, production process modularity, delay in final product assembly and finally delay in final product assembly to nearest place to customer.

**Table 4.13**
**Measurement Items for Postponement**
**of**
**Supply Chain Management Practices**

| Dimension of Supply Chain Management Practices | Measurement Items | Source |
|---|---|---|
| Postponement [PST] | Products are designed for modular assembly (PST1) | Li et al. (2005; 2006) |
| | Production process modules can be re-arranged so that customization can be carried out latter at distribution centers (PST2) | Li et al. (2005; 2006) |
| | Delays final product assembly activities until customer orders have actually been received (PST3) | Li et al. (2005; 2006) |
| | Delays final product assembly activities until the last possible position (or nearest to customer) in the supply chain (PST4) | Li et al. (2005; 2006) |
| | Goods are stored at appropriate distribution points close to customers in the supply chain (PST5) | Li et al. (2005; 2006) |

#### 4.10.1.6 Internal Lean Practices [ILP]

The methods of measuring dimension, Internal Lean Practices that can be itemized into five elements, beginning with reduce time wastage, continuous quality improvement, pull production system, shorter lead time, streamlines ordering, receiving and finally reducing paper work.

**Table 4.14**
**Measurement Items for Internal Lean Practices**
**of**
**Supply Chain Management Practices**

| Dimension of Supply Chain Management Practices | Measurement Items | Source |
|---|---|---|
| Internal Lean Practices [ILP] | Reduce time wastage in operations (ILP1) | Li et al. (2005) |
| | Continuous quality improvement program (ILP2) | Li et al. (2005) |
| | Produces only what has been ordered by customers (pull production system)(ILP3) | Li et al. (2005) |
| | Pushes suppliers for shorter lead times (ILP4) | Li et al. (2005) |
| | Streamlines ordering, receiving and other paper work from its suppliers (ILP5) | Li et al. (2005) |

#### 4.10.1.7 Agreed Vision and Goals

The methods of measuring dimension, Agreed Vision and Goals can be itemized into four elements beginning with common agreed goals, standardizing supply chain practices, clearly defined roles and responsibility and finally, responsible to each supply chain members.

**Table 4.15**
**Measurement Items for Agreed Vision and Goals**
**of**
**Supply Chain Management Practices**

| Dimension of Supply Chain Management Practices | Measurement Items | Source |
|---|---|---|
| Agreed vision & goals [VISN] | Supply chain members have common and agreed goals [VISN1] | Min and Mentzer, (2004) |
| | Supply chain members are actively involved in standardizing supply chain practices and operations. [VISN2] | Min and Mentzer, (2004) |
| | Supply chain members have clearly defines roles and responsibilities [VISN3] | Min and Mentzer, (2004); Bowersox, Closs and Stank, (1999) |
| | Known responsible of each supply chain members [VISN4] | Min and Mentzer, (2004) |

#### 4.10.1.8 Risk and Reward Sharing

The methods of measuring dimension, Risk and Reward Sharing that can be itemized into three elements, beginning with shared risk and reward, assistance in terms finance capital equipment and finally, sharing research and development costs and results among supply chain members.

**Table 4.16**
**Measurement Items for Risk and Reward Sharing**
**of**
**Supply Chain Management Practices**

| Dimension of Supply Chain Management Practices | Measurement Items | Source |
|---|---|---|
| Risk & Reward Sharing [RISK] | Supply chain members share risks and rewards [RISK1] | Min and Mentzer, (2004) |
| | Supply chain members help each other finance capital equipment [RISK2] | Min and Mentzer, (2004); Bowersox, Closs and Stank, (1999) |
| | Supply chain members share research and development costs and results [RISK3] | Min and Mentzer, (2004); Bowersox, Closs and Stank, (1999) |

### 4.10.2 Supply Chain Integration

Supply chain integration assess the extent to which all activities within an organisation, and the activities of its suppliers, customers, and other supply chain members, are integrated together (Stock and Tatikonda, 2000; Narasimhan and Jayaram, 1998; Wood, 1997; Li, 2002; Marquez et. al., 2004).

**Table 4.17**
**Measurement Items**
**of Supply Chain Integration**

| Variable | Measurement Items | Source |
|---|---|---|
| **Supply Chain Integration** | Firms in our supply chain establish more frequent contact with each other | (Sezen, 2008; Wisner, 2003) |
| | Firms in our supply chain create a compatible communication and information system | (Sezen, 2008; Wisner, 2003) |
| | Our firm extends its supply chain beyond its customers/suppliers | (Sezen, 2008; Wisner, 2003) |
| | Our firm participates in the marketing efforts of its customers | (Sezen, 2008; Wisner, 2003) |
| | Our firm participates in the sourcing decisions of its suppliers | (Sezen, 2008; Wisner, 2003) |

The methods of measuring intervening variable, Supply Chain Integration can be itemized into five [5] elements, beginning with establishment of frequent contact among members of supply chain, create compatible communication and information system, extending or supply chain practices beyond customers/suppliers, participate in marketing efforts, and finally, participate in sourcing decisions with suppliers.

### 4.10.3 Supply Chain Performance

Supply chain performances assess the extent to which the firm's supply chain performance is measured in terms flexibility performance, resource performance and output performance (Beamon, 1999; Sezen, 2008).

#### 4.10.3.1 Supply Chain Flexibility Performance

The methods of measuring the dimension, Supply Chain Flexibility Performance can be itemized into five elements, beginning with response to demand variation, response to poor manufacturing performance, response to poor supplier manufacturing performance,

response to poor delivery performance and finally, response to new product, new markets and new competitors.

**Table 4.18**
**Measurement Items of**
**Supply Chain Flexibility Performance**

| Dimension of Supply Chain Performance | Measurement Items | Source |
|---|---|---|
| Flexibility Performance | Ability to respond to and accommodate demand variations, such as seasonality | (Beamon, 1999; Sezen, 2008) |
| | Ability to respond to and accommodate the periods of poor manufacturing performance such as machine breakdown | (Beamon, 1999; Sezen, 2008) |
| | Ability to respond to and accommodate the periods of poor supplier performance | (Beamon, 1999; Sezen, 2008) |
| | Ability to respond to and accommodate the periods of poor delivery performance | (Beamon, 1999; Sezen, 2008) |
| | Ability to respond to and accommodate new products, new markets or new competitors | (Beamon, 1999; Sezen, 2008) |

#### 4.10.3.2 Supply Chain Resource Performance

The methods of measuring dimension, Supply Chain Resource Performance can be itemized into five elements, beginning with total cost of resource used, total cost of distribution, total cost of manufacturing, cost of inventory and finally, return on investment.

**Table 4.19**
**Measurement Items of**
**Supply Chain Resource Performance**

| Dimension of Supply Chain Performance | Measurement Items | Source |
|---|---|---|
| Resource Performance | Total cost of resource used | (Beamon, 1999; Sezen, 2008) |
| | Total cost of distribution, including transportation and handling cost | (Beamon, 1999; Sezen, 2008) |
| | Total cost of manufacturing, including labour, maintenance and re-work cost | (Beamon, 1999; Sezen, 2008) |
| | Cost associated with held inventory | (Beamon, 1999; Sezen, 2008) |
| | Return on investment | (Beamon, 1999; Sezen, 2008) |

### 4.10.3.3 Supply Chain Output Performance

The methods of measuring dimension, Supply Chain Output Performance can be itemized into seven elements, beginning with sales, order fill rates, on time delivery, customer response time, shipping error, manufacturing lead time and finally, customer complaint.

**Table 4.20**
**Measurement Items of**
**Supply Chain Output Performance**

| Dimension of Supply Chain Performance | Measurement Items | Source |
|---|---|---|
| Output Performance | Sales | (Beamon, 1999; Sezen, 2008) |
| | Order fill rate | (Beamon, 1999; Sezen, 2008) |
| | On time delivery | (Beamon, 1999; Sezen, 2008) |
| | Customer response time | (Beamon, 1999; Sezen, 2008) |
| | Shipping error | (Beamon, 1999; Sezen, 2008) |
| | Manufacturing lead time | (Beamon, 1999; Sezen, 2008) |
| | Customer complaints | (Beamon, 1999; Sezen, 2008) |

## 4.11 Method of Survey

Survey methodology is employed in this study. This survey is basically a snapshot survey of companies at a certain point of time, and this has been frequently employed in organisational based studies (Joiner, Spencer, & Salmon, 2009; Miyagawa & Yoshida, 2005; Pinho, 2008). Recently, web based surveys are becoming popular because they are easier and faster. However, the response rate is lower relative to mail surveys. In this study, only mail and personnel administrated surveys were used.

The mail survey was used to reach a relatively large sample of electronics firms 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 suggested that a mail survey, compared to other methods, is relatively cheap, much information can be obtained 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 qualitative data (May, 2002). Moreover, this type of survey offers the maximum potential to produce results that are generalisable and precise in terms of the population (Firestone, 1987). Most researchers in relation to firm base survey adopt a mail survey approach despite difficulties associated with low response rates (Newby, Watson, & Woodliff, 2003).

It is important to minimize the errors that are associated with the mail survey method of data collection (Mangione, 1998). One of the common errors in mail survey is non-response error. In order to address this non-response error, the study targets to achieve a high response rate by employing various techniques: reminders, as suggested by Cooper and Schindler (2003), telephone pre-notification (Schlegelmilch & Diamantopoulos, 1991), coloured paper (LaGarce & Kuhn, 1995), using double-sided rather that single-sided or short rather that long questionnaires (Jobber, 1998). In addition, the university logo has been found to increase response rate (Greer & Lohtia, 1994). Assurance of anonymity has generally proven successful in acquiring higher response rate (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, (2000) were adopted. The questionnaire was designed in an easy to read format with a total of nine pages.

A detailed structured questionnaire was administrated at the firm level. A significant challenge for this study is to find the appropriate managers who can answer variety of questions spanning upstream till downstream supply chain process. Managers with appropriate titles (i.e., managers or directors of logistics, distribution, or supply chain management) are targeted. We used two sources of motivation for managers in order to increase their participation. First, we informed them that The Malaysian Logistics and Supply Chain Association (MALSCA) endorsed this study. Second, we also informed them that a copy of the study findings would be provided to them (Rokkan, Heide, & Wathne, 2003).

This study used the individual such as managers related to the supply chain operations as the unit of analysis in this study. We used companies from a variety of electronics industries such as computers, telecommunication, communications, and semiconductors. The selection of companies from different industries provided us with substantial variation in the levels of practices, integration and performance measurement mechanisms used by companies.

### 4.12 Pilot Test

The purpose of pilot study is to verify the validity and reliability of the questionnaire instrument. This effort is an essential prerequisite before conducting the official survey based data collection nationwide. In other words, this process or procedure is necessary to ensure the respondents understood the instruction and the question asked. Consequently, these will further improve the comprehensibility of the drafted questionnaires (Antonio, Yam, & Tang, 2007). As such, this study conducted two pilot studies. In the first study, 5 experts [academics and practitioners] were interviewed to discuss the content and wordings of the questionnaire. The practitioners were senior managers in the sample industries.

The measurement instrument and items which were developed through the review of literature was further reviewed by these experts, a recommendation by (Bienstock, Mentzer, & Bird, 1997). This expert opinion encompasses evaluation of several pertinent component of survey instrument which includes questionnaire items and cover letter in terms of item specificity, clarity of construct and reliability (content validity and face validity). As a result of this comprehensive expert opinion, several measurement items were reconstructed. The reconstruction of measurement instrument involves elimination of items and rewording of questions for better clarity from the perspective of representative.

The subsequent, pilot study was a pre-test of the improved questionnaire and it consists of 30 respondents from electronics firm. All samples chosen for the pre-test were from the same population of survey. Simple statistical analyses were used to test the reliability of the scales for the purpose of improving the comprehensiveness of the questionnaire instrument (Dillman, 1983; B. B. Flynn, et al., 1990). The result of the study showed that the Cronbach's alpha reliability coefficient for the supply chain management practices was in the range of 0.651 to 0.885, supply chain integration 0.712, supply chain performance was in the range of 0.844 to 0.914, indicating that the instrument is a reliable measure.

### 4.13 Common Method Bias

This study adopted self-reported measures and collected data only from a single respondent from each target firm. As a result, this study is exposed to common method bias (Meade, Watson, & kroustalis, 2007). Common method bias is a function of the differences among methods and the concreteness of the constructs the measure represents (Doty & Glick, 1998). Some researchers argue that relying on a single informant to answer complex social judgments about organization characteristics increases random measurement error. Thus, strong assessments of convergent or discriminant validity cannot be made. However, the cost associated with using multiple informants from each organization is prohibitive. Therefore, this research used data from a single respondent while attempting to minimize the extent of common method variance by targeting the surveys to senior managers (Tan, 2002). It is assumed that the senior managers were more objective and knowledgeable with respect to their firms' operations.

## 4.14 Summary

In this summarization, the theoretical framework of the study has been developed using resource-based view as the basic platform while incorporating the literature of supply chain practices, integration, performance and others. Through the extensive search of literature consensus emerges stating that the new combination of several dimensions of supply chain practices would render for the provision of new insights on studying supply chain integration and supply chain performance.

Next, this study attempts to examine the link between supply chain practices, supply chain integration and performance. The mediating role of supply chain integration is also examined to further strengthen the conceptual framework. To achieve these objectives, a quantitative hypothetical deduction methodology was applied and data was collected through a mail survey. Then, the data was analyzed by using multivariate analysis using SPSS version 15.0 as the software application. The subsequent chapter provides an empirical evidence based on the theoretical model developed. It is in this chapter that elaboration is presented regarding issues on how the study was conducted, what detailed information on the measurements and what is the criteria of the sampling were further explained.