ANTECEDENTS OF SUPPLY CHAIN RELATIONSHIPS BETWEEN MNCs AND SMEs IN AGILE ENVIRONMENT

Nazura Mohamed Sayuti

School of Business Information Technology and Logistics

RMIT University

February 2013

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy from the Royal Melbourne Institute of Technology

STATEMENT OF AUTHORSHIP

I certify that except where due acknowledgement has been made, the research is that of the author alone; the research has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of research which has been carried out since the official commencement date of the approved research program; and, any editorial work, paid or unpaid, carried out by a third party is acknowledged.

Nazura Mohamed Sayuti
February 2013

DEDICATION

This dissertation is dedicated to

my beloved parents

and,

the loves of my life.

ACKNOWLEDGEMENTS

Alhamdulillah for the learning experience that Allah s.w.t. has granted me in my pursuit of the degree of Doctor of Philosophy. I am most grateful to HIM for granting me wisdom to undertake this research. The successful completion of this thesis is with HIS blessings. This journey of knowledge was filled with triumph, excitement, frustration and satisfaction. I also thank Him for His peace in time of frustration; for His joy in time of sorrow; for HIS strengths in time of weaknesses; for His faithfulness when I stray; and for HIS unfailing mercies.

The road to a PhD is often a solitary journey, but it could not be accomplished without the support of family and friends. I would like to acknowledge those who assisted and supported me on this very challenging and rewarding journey. My deepest appreciation goes to my principal supervisor, Professor Shams Rahman, for his invaluable and unfailing support, advice, guidance and encouragement in bringing this research work to a successful completion. I regard him as a personal friend, and I highly praise him for his academic achievements, superior knowledge and experience. He has taught me to enjoy my PhD journey and he will always be my inspiration in the academic world. I would also like to thank my second supervisor, Dr Ahmad Abareshi, for his guidance, valuable advice and informal talks, encouragement and support.

This is a major milestone in my life, for which I am extremely grateful to my husband, for his continuous support, for always encouraging me to do my best, and for believing my capabilities as a mother and PhD student. I thank my children, whom are the precious assets of mine, Rezza and Alyssa for the unspeakable joy and colors they bring to my life. I appreciate their understandings and sacrifices throughout the journey. All they need to know is they have contributed to my emotional strengths in pursuing this challenging journey of mine.

I thank my beloved mum, Faridah Ibrahim for everything she is, for her continuous prayer and words of wisdom; my father, Mohamed Sayuti Abu for a good education and support; I am grateful to my sisters, brothers, nieces and nephews for bringing joy to my life. Their unconditional love and constant support over the years is something that I cannot thank them enough for. Not a single day passes by that I do not think of them.

My sincere thanks to the Ministry of Higher Education Malaysia and Universiti Teknologi Mara (UiTM, Shah Alam), Malaysia for awarding me the scholarship and opportunity to pursue this study at RMIT University Melbourne; the staffs of the Business Management Faculty, UiTM Shah Alam and the School of Business Information Technology and Logistics (BITL), RMIT University for numerous help during this course of research. Last but not least, this thesis is expressly dedicated to a number of special friends and colleagues who consistently giving me support and unfailing encouragement, for lending their ears listening to my grudges, and sharing the good and bad moments throughout the journey. I love you all!

May you all be blessed with good life!

ABSTRACT

In a constantly changing global competitive environment, an organisation's supply chain relationship directly impacts its ability to produce, and deliver innovative products to their customers in a timely and cost effective manner. The emerging area of supply chain relationship has received considerable attention in the academic and managerial press, yet there are many unanswered questions regarding the dynamics of such relationships. While the beneficial impact of supply chain relationship is generally acknowledged, very little research exists to date addressing what constitute supply chain relationship success in agile environment. A number of such fundamental issues drive this research initiative, including what are the antecedents of supply chain relationships between multinational companies (MNCs) and small and medium enterprises (SMEs) in Malaysian electrical and electronics industry.

The study begins by establishing the definition of supply chain relationship, based on a comparison of both theoretical and managerial descriptions. The critical antecedents associated with the supply chain relationships are next developed, and the magnitude of the effect of these constructs on partnership in agile environment is assessed. Three critical antecedents of supply chain relationships which are; partner's characteristics capability, alliance management capability and process capability, were established from resource-based and extended resource-based theories. This study presents a framework of an organisation's resources and capabilities as an important antecedent of supply chain relationships.

Using extensive literature reviews and empirical data, measurement scales of partner's characteristics capability, alliance management capability and process capability were developed to relate the supply chain relationships model. The model was then tested using confirmatory factor analysis, structural equation modelling and multigroup analysis. The analysis employs quantitative data, collected through drop-and-collect method to 300 MNCs and SMEs respectively, in order to avoid low response rate.

Findings reveal that in agile environment, partner's characteristics capability, alliance management capability and process capability directly and positively impacted supply chain agility practices in the dyad. The results also support the view that supply chain agility practices are impacted by the synergy among the three antecedents of supply chain relationships.

The following attributes of organisations were found to be significantly related to partnership success in agile environment: innovation capability, information technology capability, process flexibility proficiency, partner compatibility, resources complementarities, cooperation and conflict management. The implications of these results for theoretical and managerial decision making in developing mutually beneficial supply chain relationship in agile environment are discussed.

PUBLICATIONS, CONFERENCE PRESENTATIONS, AND AWARDS OF THE CANDIDATURE ORIGINATING FROM THE PRESENT THESIS

- Sayuti, N (2010), 'Critical Determinant of Buyer and Supplier Relationships between Multinational Companies and Small and Medium Enterprises in Malaysian Electrical and Electronics Industry', Confirmation of Candidature, 17 March 2010, School of Business Information Technology and Logistics, RMIT University, Melbourne

- Sayuti, N (2011), 'Critical Determinants of Agile Supply Chain in Buyer and Supplier Relationship: A Literature Review and Future Direction', International Journal of Business and Management Studies, Vol 3, No 1, 2011 ISSN: 1309-8047 (Online)

- Sayuti, N & Rahman, S (2011), 'Critical Determinants of Buyer-Supplier Relationships in Agile Supply Chain: An assessment Using the Analytical Hierarchy Process', Proceedings of the 25th ANZAM Annual Australian and New Zealand Academy of Management Conference , 7-9 December 2011, Wellington, New Zealand

- Sayuti, N, Rahman, S (2012), 'Relationship Constructs in the Agile Environment: A Comparison between MNCs and SMEs in the Context of Malaysian Electrical and Electronics Industry', 17th International Symposium on Logistics, 8-11 July 2012, Cape Town, South Africa.

- Sayuti, N (2012), 'Antecedents of Supply Chain Relationship in Agile Environment: An Empirical Study of Malaysian Electrical and Electronics Industry', Completion Seminar, 18 May 2012, School of Business Information Technology and Logistics, RMIT University, Melbourne

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

Agile	Manufacturing Philosophy Calling for High Levels of Responsiveness to Customer Dynamics
AHP	Analytical Hierarchical Process
AMC	Alliance Management Capabilities
AMOS	Structural Equation Modelling Software Program
ANOVA	Analysis of Variance Analysis
CM	Conflict Management
CO	Cooperation
D&D	Design and Development
E&E	Electrical and Electronics
ERBV	Extended Resource-based View
ETP	Economic Transformation Plan
FP	Flexibility Proficiency
ICT	Information and Communication Technology
IMP3	Industrial Master Plan 3
IN	Innovation
IT	Information Technology
M&E	Machinery and Equipment
MNC	Multinational Companies
MSC	Multimedia Super Corridor
NPD	New Product Development
PC	Personal Computer
PC	Process Capabilities

PCB	Printed Circuit Board
PCC	Partner's Characteristics Capabilities
PLC	Product Life Cycle
PO	Partner Compatibility
RBV	Resource-Based View
RC	Resource Complementarities
SC	Supply Chain
SCAP	Supply Chain Agility Practices
SCFP	Supply Chain Financial Performance
SCM	Supply Chain Management
SCOP	Supply Chain Operational Performance
SCR	Supply Chain Relationship
SCR	Supply Chain Relationship
SEM	Structural Equation Modelling
SME	Small and Medium Enterprises
SPSS	Statistical Analysis Software Program

CHAPTER ONE
INTRODUCTION

1.1 Introduction

In today's competitive economy, focus has steadily increased on delivering value to the customers. Globalisation, technological change and demanding customers make the marketplace more fiercely competitive than ever before (Fawcett & Magnan, 2002 ; Fawcett et al., 2007). Concurrent to the focus on customer value, the marketplace in which businesses operate today is widely recognised as being complex and turbulent (Christopher, 2000). Therefore, organisations are urged to improve their operations, by becoming more interconnected and interdependent than before.

The expansion of supply chains, while enhancing profitability, customer responsiveness and the ability to deliver value to the customers, has at the same increased the interconnections and interdependencies among organisations. The global marketplace has become very volatile, with customers demanding lower prices, faster delivery, higher quality and increasing variety (Narasimhan & Das, 1999; Christopher, 2000; Power et al., 2001; Li & Lin, 2006; Kisperska-Moron & de Haan, 2011). Shortened product life cycles (Vonderembse et al., 2006), market uncertainty in the global economic (Flint, 2004) and pressure from competitive forces (Hervani et al., 2005) may force organisations to reinvestigate how their supply chains are structured and managed, in order to respond to the increasing market complexity, turbulence and uncertainty.

It is recommended that the key to survival for organisations dealing with more innovative products such as electronics is creation of responsive or agile supply chains.

According to Yusuf et al., (1999, p. 34), agility has been defined by The Iococca Institute of Lehigh University U.S.A. as a “system with extraordinary capabilities to meet the rapidly changing needs of the marketplace”. Agility is the ability to respond rapidly to changes in customer demand, both in product volume and variety (Christopher, 2000; van Hoek et al., 2001). It is a system that responds quickly to new product models or between product lines, ideally in real-time response to customer demand. According to Gunasekaran (1999) four main principles underpin agility are:

i. delivering value to the customers;
ii. being ready for change;
iii. valuing human knowledge and skills; and
iv. forming virtual partnerships.

There is growing recognition that in agile supply chains, individual organisations no longer compete as stand-alone entities, but rather as whole supply chains. In agile supply chain, a confederation of partners is linked together as a network. Gradually, it is becoming an era of “network competition,” where the orders will go to those organisations who can better structure, coordinate, and manage the relationships with their partners in a network committed to better, closer, and more agile relationships with their final customers. It can be argued that in today's challenging global markets, the route to sustainable advantage lies in being able to leverage the respective strengths and competencies of network partners in the supply chain to achieve greater responsiveness to market needs.

The prime focus in supply chain management (SCM) is the relationships between partners in supply chains, integrating activities from the original suppliers to end customers with benefits of adding value, maximising profitability through efficiencies, and achieving customer satisfaction (Mentzer et al., 2001; Hitt et al., 2008; Stock & Boyer, 2009). Organisations embrace SCM as it focuses on actions along the entire value chain (Tan, 2001; Childerhouse et al., 2002; Vonderembse et al., 2006). It views the entire process as one system that benefits all members in the supply chain with its process operations.

Relationship management is vital, as supply chains are generally complex, with numerous activities usually spread over multiple functions or organisations. sometimes these activities can even be spread over lengthy time horizons (Burgess et al., 2006; Mahapatra, 2011). Therefore, it is necessary to overlay a coordination system with alliance partners, which may include an explicit definition of processes, responsibilities and structures, aligned with overall objectives and the whole supply chain, to bring together multiple functions and organisations within the supply chain.

Strategic alliances or relationships are collaborative organisational arrangements which use resources and manage operational structures from more than one organisation (Hitt et al., 2008). According to Pansiri (2005), strategic alliance is purposive arrangements between two or more independent organisations that form part of, and are consistent with, participants' overall strategies, and contribute to the achievement of their strategically significant objectives, and are mutually beneficial. Organisational relationships between members in a supply chain network have been recognised as a major influence of the ultimate value and customer satisfaction achievable. These intra- and inter-organisational relationships play an important role in organisation's ability to respond to dynamic and unpredictable change. Supply chain management is therefore not simply engaged in the exchange of money for goods and services, but also in the management of the buyer-seller relationship (Leenders et al., 2006).

In many industries, complexity and uncertainty have increased to the point that competing autonomously is no longer an option. The characteristics of products produced and processes involved in manufacturing contribute to the complexity of the relationship. Speed, quality, and flexibility are being emphasised as means of responding to the unique needs of customers and markets. However, the core resource competencies required to realise the extended range of objectives are often difficult to mobilise and retain by individual companies (Gunasekaran & Yusuf, 2002). Thus, in an agile supply chain, a high degree of cooperation between members of the supply chain is required.

This study attempts to explore some of the antecedents of supply chain relationships between MNCs and SMEs in the agile environment, in the context of the Malaysian Electrical and Electronics Industries. The antecedents identified using Resource-Based View (RBV) and Extended Resource-Based View (ERBV) theories include partner's characteristics capability, alliance management capability, and process capability, which will be further discussed in Chapter 3. The study also examines the impact of supply chain agility practices on organisations' operational and financial performance.

1.2 Background to the Research

With continuous emerging of advanced communication technology, customers are becoming more educated and exposed to more unique and sophisticated products. Organisations are competing to introduce, produce and deliver products to meet these customers' distinctive demands. Attempting to survive with market instability, organisations now look beyond cost and quality advantage.

According to Yusuf (2004), changing customer market and technological requirements force manufacturers to develop agile supply chain capabilities, in order to remain competitive. Therefore, manufacturers are stressing agility and flexibility in order to respond in real-time to the unique needs of customers and markets. However, the resource competencies required are often difficult to mobilise and retain by single companies (Gunasekaran, 1999; Yusuf et al., 2004). It is therefore imperative for companies to co-operate and leverage complementary resources with other companies in the supply chain.

Relationships between members of the supply chain are different, based on whether it is an agile or lean supply chain. Organisational relationships within the agile environment are expected to become more complex (Sarkis & Talluri, 2001). This complexity is due to the greater need for rapid integration among members of agile relationships, which arises from a web of varied partners integrated as a single organisation, with the ultimate goal of addressing customers' needs. For example, in the agile supply chain, manufacturers aim to produce goods in volumes at short lead times and deliver to a wide variety of market niches simultaneously. Thus, in agile supply chains, partnerships characteristics are categorised as fluid cluster, where speed, flexibility and quality have become the suppliers' criteria in choosing suppliers (Christopher & Towill, 2002; Cagliano et al., 2004).

Different product types call for different types of supply chain. Alignment between the type of product and the type of supply chain is important, and significant for delivery speed, delivery dependability, and cost performance (Selldin & Olhager, 2007). This is supported by Fisher's concept that products can be either functional or innovative, depending on their demand pattern and market expectations. According to Fisher (1997) a functional product is assumed to require a efficient supply chain, whereas a innovative product would require a market responsive supply chain. Products which are innovative are characterised by variation in demand and by short life cycles. They should therefore be transformed through a responsive supply chain that has extra capacity, the capability for market information processing, and which is more flexible. On the other hand, a steady demand pattern, high volumes and long product life cycles characterise products which are functional. An efficient supply chain which focuses on cost minimisation and high utilisation of resources should handle this kind of products. The other two combinations are assumed to create mismatches between supply chain and products. The four combinations are illustrated in Figure 1-1: Matching Supply Chains with Products (Fisher, 1997).

	Functional Products	Innovative Product
Efficient Supply Chain	***Match***	***Mismatch***
Responsive Supply Chains	***Mismatch***	***Match***

Figure 1-1: Matching Supply Chains with Products (Fisher, 1997)

Many researchers, (Bello et al., 1999; Bensaou, 1999; Barratt, 2004; Gunasekaran & Ngai, 2005), have recognised the increased need for collaboration, stressing the establishment of closer and longer-term working relationships even partnerships with suppliers at various levels in the chain. Those relationships construct ever more efficient and responsive supply chains, in order to deliver exceptional value to customers. Such understanding is also essential for developing and testing theories relating to relationship development in the agile supply chain context.

Sustainable market environments encourage businesses increasingly reliant on the relationships they have with their suppliers, and demand adherence to high standards. Alliances create interesting managerial issues, with the involvement of knowledge exchange between partners. For example, strong relationships with suppliers are essential to stay ahead of competition (Parsons, 2002). According to Hoyt and Huq (2000), if the relationship is too restrictive, flexibility will be difficult to achieve, and if too lenient, the risk of opportunism will be present. Organisations have often had adversarial relationships with their supply chain members. Many organisations, both in manufacturing and service industries, try to improve their performance in terms of profits, even though it might result in losses by other supply chain members (refer to original suppliers, immediate suppliers, manufacturers, wholesalers, warehouses, logistics firms, retailers, and customers).

Partnerships enable different people and organisations to support each other by leveraging, combining, and capitalising on their complementary strengths and capabilities (Barney, 2000). Lately, organisations have realised that integrative relationships with supply chain members can provide benefits, such as reduced cost, reduced cycle time in order fulfilment, lower inventory levels, high visibility, and reduction in the time required to bring new products to market (Acquaah, 2009; Andersen et al., 2009).

1.3 Scope of the Study

This study focuses on the context of organisational resources and capabilities of SMEs and MNCs in the Malaysian Electrical and Electronics Industries. Its scope is limited to those enterprises defined as SMEs using definition (based on number of employees) approved by the National SMEs Development Council (NSDC). Details of SMEs are given in section 2.6. Meanwhile, the responding MNCs in this study are located at Multimedia Super Corridor Zones as explained in section 2.4 and section 2.5. In this study, SMEs are the suppliers and MNCs are the buyers. This study uses data from only the most important single respondent for each participating firm, with knowledge and experience in supply chain management, procurement, operations management and production.

1.4 Problem Identification

Fierce competition in today's global markets, the introduction of products with shorter life cycles, and the heightened expectations of customers have forced business enterprises to invest in, and focus attention on their supply chains. Organisations are undergoing a revolution in terms of implementing new operational strategies and technologies in response to the challenges and demands of the Twenty-first Century (Gunasekaran et al., 2008). This would encourage organisations to seriously explore the potential of the concept of supply chain management as responding to customers' unique and rapidly changing needs, and improve revenue growth.

Organisations are stressing flexibility and agility in order to respond to the unique needs of customers and markets in real time. However, the resource competencies required are often difficult to mobilise and retain by single organisations. It is therefore imperative for organisation to co-operate and leverage complementary competencies. Given the resource constraints within which most manufacturing firms have to operate today (Narasimhan et al., 2006), it is useful to develop a good understanding of how relationships between SMEs and MNCs have been developed, and what their constituent dimensions are in the context of agile supply chains. This notion is supported with a study done by Betts and Tadisina (2009) who mentioned when a supply chain is agile and environmental uncertainties exist, strategic relationships with partners in the supply chain will have a greater influence on supply chain performance.

However, collaboration between partners cannot be looked at from only the buyer's perspective as many do, but requires a dyadic perspective (Johnston et al., 2004; Kozan et al., 2006).

1.5 Research Question and Objectives

The main research question of this study is:

> *"What are the critical antecedents of supply chain relationships between small and medium enterprises (SMEs) and multinational companies (MNCs) in Malaysian electrical and electronics supply chains, and their impact on performance?"*

In order to address the main research question, the following specific objectives are formulated:

i. To identify the antecedents of supply chain relationships between MNCs and SMEs in Malaysian electrical and electronics industry;
ii. To examine the impact of supply chain antecedents on supply chain agility practices;
iii. To examine the impact of supply chain agility practices on the operational and financial performance of the organisation;
iv. To measure the impact of supply chain operational performance on supply chain financial performance.

1.6 Justification for the Research

Supply Chain Management (SCM) is by now recognised by many companies as a means by which they can gain competitive advantage and improve business results (Narus & Anderson, 1996; Spekman et al., 1999; Wisner et al., 2009; Wouters et al., 2009; Ponis, 2012). Effective SCM therefore becomes a strategic factor in a firm's success (Spekman et al., 1999; Tan & Cross, 2012). This is particularly the case as more companies link their advantages together and start to operate as supply networks of interdependent supply chain partners as opposed to separate, stand-alone, arms-length entities (Spekman et al., 1999). Linked with such an approach is the integration of intra- and inter-business processes in order to optimise the whole business performance. Studies suggest that companies such as Dell, Hewlett-Packard, Wal-Mart and Georgia-Pacific Corp, have effective supply chain networks that competitively outperform the stand-alone model (Robertson, 2006; He, 2012). This superior performance manifests itself as performance advantages on aspects such as supply chain lead time, delivery reliability, ability to respond to customer demand changes, cost and inventory levels (Shin et al., 2000; Cao & Zhang, 2011; Singh et al., 2012).

Supply chain management is a complex concept. That is, in the broad sense SCM covers all aspects of a supply chain's activities from end supplier to end customer and includes all the intra-business and inter-business processes that are linked with the flow of products and orders from raw materials to final customer (Gripstrud et al., 2006). There are unprecedented pressures on companies to improve their operational efficiency for enhanced competitiveness and overall business performance. Such pressures include competition from foreign products, new product introduction by competitors, falling product life cycle (PLC), unanticipated customer shifts, and advances in manufacturing and information technology (Browne et al., 1995; Zhu et al., 2011). In addition, customer sophistication and emergence of intelligent products have led to more difficult design specifications and expectations on value-added deliverables (Bhattacharya et al., 1996; Weigelt & Sarkar, 2012).

This research deals specifically with critical antecedents of supply chain relationships between suppliers (SMEs) and buyers (MNCs) in the Malaysian electrical and electronics industry. The belief is that increased organisational resources and capabilities in the dyad will increase the supply chain agility practices between SMEs and MNCs in the industry. Improved relationships are believed to assist organisations to increase their supply chain agility practices, and such will improve organisational performance ultimately to higher organisation's returns, strategic and operational level.

In Malaysia, SMEs operate in almost every major industry, and contribute substantially to the national economy. The interest of the Malaysian Government in developing and improving the efficiency of SMEs has been flourishing for many years. Despite the assistance programs, SMEs encounter various problems in their operations, such as late deliveries, stock out, uncertainty of customer demands and others. As the suppliers to major operators, Malaysian SMEs must be aware of the significant determinants that those major buyers emphasise for building successful supply chain relationships. Additionally, there have been limited attempts to determine factors of agile supply chains that can help overcome their weaknesses as well as contribute to their success. Given this gap, this study attempts to provide Malaysian SMEs with strategic operational ideas to enable them to become strategic partners to the multinational companies in the Malaysian Electrical and Electronics Industries. This study develops and presents integrative idea for examining and understanding the resources and capabilities of the organisations in order to improve their operational and competitive business performance.

In general, organisations can use the findings of this research question to shape their supply chain strategies. Specifically, they will be able to make informed choices about:

i. Which organisational resources and capabilities to develop for building a good relationship in agile environment, and
ii. What are the effects of supply chain agility practices on organisational performance?

1.7 Thesis Structure

This thesis comprises of eight chapters. Chapter 1 covers the research background, scope of study, the research problems, its objectives and research question. A justification for the research is also presented, followed by a general overview of the methodology, thesis structure, and definition of terms and summary which leads to Chapter 2.

Chapter 2 briefly discusses the scenario of the Malaysian Electrical and Electronics Industries. The chapter provides the performance overview of the industry in Malaysia, Multinational Companies (MNCs), Multimedia Super Corridor Zones in Malaysia and

Malaysian SMEs. The discussion includes the issues associated with them to highlight their significant in this study.

Chapter 3 presents a comprehensive review of existing literature that focuses on theoretical concepts, empirical research and associated evidence relating to the current study. This chapter focuses on three organisational resources and capabilities, supply chain agility and organisational performance. The research framework flowing from the literature review is then presented, including specific hypotheses development. This chapter also rationalises the use of instruments to measure the factors of interest.

Chapter 4 presents the primary research methodology underpinning this study, which includes details on the research paradigm, empirical research design, including unit of analysis, research instrument, and process of survey development including pre-test, pilot studies, main study and SEM data analysis stage. Ethical considerations and conclusion leading to the next chapter are also discussed.

Chapter 5 discusses the primary research methodology on the statistical procedures that will be implemented in data analysis and statistical findings. This chapter is the major contributor to the development of Chapter 6 of this study.

Chapter 6 presents the data analysis and discussion on the statistical findings which aim at interpreting the statistical results. It makes the major contribution by presenting the analysis of the descriptive data and examining the unidimensionality of the model through a confirmatory factor analysis (CFA) approach. This chapter also presents the analysis of the structural model using structural equation modelling (SEM), to answer the research question and validate the hypotheses. multigroup analysis is also presented in this chapter.

Chapter 7 interprets and discusses the findings from the statistical analysis in previous chapter. The discussion is organised to answer the research objectives and hypotheses developed in Chapter 3. This chapter clarifies the creation of supply chain antecedents for this research and reports the impact of each supply chain antecedents discussed on supply chain agility practices. The impact of supply chain agility practices on organisational and financial performance is also discussed. Finally, this chapter highlights the impact of supply chain operational performance on supply chain financial performance

Chapter 8 concludes the final thesis with conclusions, implications, limitations and recommendation for future research. This chapter deliberates the conclusion of the research based from the research findings elaborated in previous chapter. This chapter discusses the conclusion based on the research hypotheses, research model and research problems. The theoretical and managerial implications of the research findings are also briefed before this chapter is concluded with the overall summary.

1.8 Summary

The nature and operational strategy of manufacturing organisations have been changing for some many years now. A more recent change is the application of supply chain management concepts. With this approach, organisations along a common supply chain change how they deal with, and interact with other partner organisations along the same chain. That is, adversarial relationships are replaced with cooperative and collaborative approaches, such that efficiencies and marketplace performance factors are improved. In this way, supply chain participants see their partners, and not arms-length entities. In this way, supply chain becomes the competitive model rather than single company against other single companies.

Flowing from that, this research chose to address the specific question of relationships developed between the partners in the supply chain. The research question derived therefore was:

> *"What are the critical antecedents of supply chain relationships between small and medium enterprises (SMEs) and multinational companies (MNCs) in Malaysian electrical and electronics supply chains, and their impact on performance?"*

Justification for the work revolves around the value potential that the answer to the research question can bring to supply chain practitioners, educators, researchers and strategists. That is, by answering the question, another piece of supply chain management underlying important concepts and practices are uncovered, thus making it possible for the above groups to use such knowledge to enhance their performance.

The explanations of scope of work, methodology and thesis structure sections may provide readers with some guidance to help navigate the remainder of the report. The discussion in this chapter leads to Chapter 2 on the development of the electrical and electronics industry in Malaysia, MNCs and SMEs involved in this study.

CHAPTER TWO

OVERVIEW OF ELECTRICAL AND ELECTRONICS INDUSTRY, MNCs AND SMEs IN MALAYSIA

2.1 Introduction

The electrical and electronics (E&E) industry is one of the most important industrial sectors in Malaysia, which consist of MNCs and local SMEs (Ahmad & Yusof, 2010). This chapter describes the overall view of E&E in Malaysia, multinational companies and small and medium enterprises involved in the industry. The chapter reviews the Malaysian E&E scenario, specifically the development issues and the involvement of MNCs and SMEs. Multimedia super corridor zones are also discussed, to highlight Malaysia's aim to enhance the growth of the industry.

Following the introduction in Section 2.1, Section 2.2 deliberates the development of E&E in Malaysia, and the discussion of its sub-sectors is deliberated in Section 2.3. Section 2.4 is a focal point of this chapter, as it describes MNCs in Malaysia. Section 2.5 addresses the MSC zones established for this industry, while Section 2.6 details another focal point of this study, which is the SMEs. This section details the profile of SMEs, their development, and government policies and programs, before the concluding remarks in Section 2.7.

2.2 Malaysia's Electrical and Electronics (E&E) Industry

Over the last three decades, Malaysia has developed into a major global manufacturing base for the electronics industry. Malaysian E&E started in the early 1970s as a result of the government's initiatives to promote labour-intensive and export-oriented industries.

With the establishment of the first semiconductor plant in Penang in 1972, the electronics industry has developed rapidly, to become the largest industry within manufacturing sector, and a significant contributor to the country's economy. Today, Malaysia's policy for success in attracting foreign investments into the country's E&E is based on a market-oriented economy, combined with a young and educated workforce, excellent infrastructure, and government commitment to maintain a business-friendly environment.

Targeting higher value added activities incorporating research and development (R&D), design and development, after sales support and marketing, instead of purely mass assembly and production, the E&E industry continues to be the leading industry within the manufacturing sector in Malaysia, and is the largest contributor to manufacturing output, exports and employment. According to the Malaysian Industrial Development Authority (2012), the E&E industry was a leading sector in Malaysia's manufacturing sector in 2011, contributing significantly to the country's total investment (RM20.1 billion), exports (RM13.7 billion) and employment (42,688). Figure 2-1 shows the components of Malaysia's export in 2011. Among other export products, the export of E&E products represented by machinery, appliances and parts, was 34.1%, the highest contribution to the total export of RM694.5 billion.

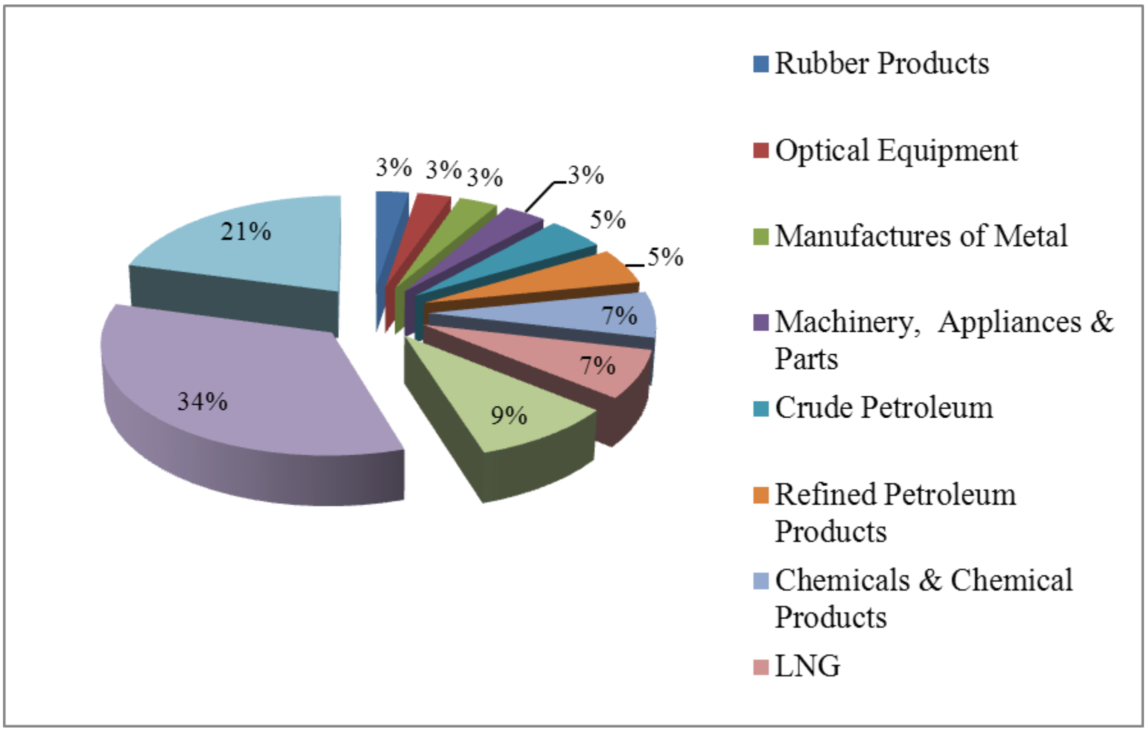


Figure 2-1: Components of Malaysia's Export in 2011
Source: Department of Statistics Malaysia

Malaysian E&E started with less than 600 workers in 1970 (MIDA, 2009). Over the past four decades, the industry has attained world-class capabilities. There are currently more than 900 companies employing 463,616 workers. Figure 2-2 shows the growth of the Malaysian E&E industry's contribution to output and employment. Due to the impact of the global economic recession in 2007, the output value reported was RM14.2 billion (US$1=RM3.80), the growth of which was reduced by 4.5% from 2006. However, being the major contributor to Malaysian manufacturing output, E&E continues to contribute to the total manufacturing output. In 2009, E&E contributed RM144.8 billion, with significantly increased growth of 7.4% from 2008.

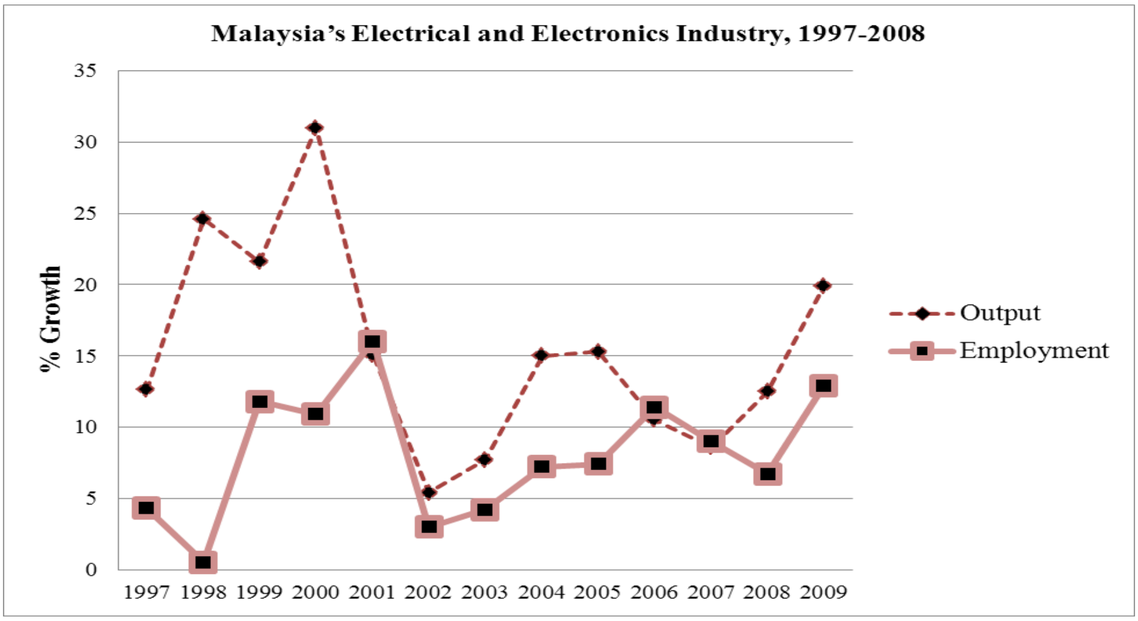


Figure 2-2: Malaysia's Electrical and Electronics Industry, 1997 – 2009

Source: Department of Statistics, Malaysia

Today, Malaysia's E&E Industry has developed significant capacities and skills in the manufacture of a wide range of semiconductor devices, high-end consumer electronic goods and information and communication technology (ICT) products. Consumer electronics for example, made up of audio-visual products, gaming devices and digital cameras, are represented by many reputable brands from Japan and Korea. The E&E manufacturers in the country continuously aimed to produce higher value-added products to remain competitive. These include intensification of R&D efforts and in-sourcing activities for their related companies worldwide. The foreign participators for example, have given notable input and growth to the specialised area of consumer electronics through R&D activities in the region.

Within the E&E industry, the electronic components sector has developed and expanded where Malaysia is well-known for its manufacture of semi-conductors, and involves packaging, assembly and testing (FMM, 2008a). Malaysia is now among the world's largest exporters of semiconductor devices and audio-visual equipment. Other components include substrates, printed circuits and connectors. This sub-sector accounted for more than half of total E&E investment in 2008.

Malaysia aims to develop full-fledged electronics and ICT clusters built around semiconductors, with core activities in wafer fabrication, ICT design, and the manufacture of end-equipment such as digital audio-visual and ICT products. The ICT products are classified into two broad subsectors:

i. Computers and computer peripherals and data storage devices; and
ii. Telecommunications equipment/devices.

Like other emerging countries, Malaysian electrical and electronics industry is also been impacted by the growth of electrical and electronics products manufacturing in China. China is raising high-technology exports in tandem and acting as an engine of export growth, with imports outpacing exports. This may change, however, as China climbs the value chain and takes over activities that have driven East Asian export growth even within integrated production systems. (Lall and Albaladejo, 2004). China is most threatening to neighbours that rely primarily on low wages and productive labour for their export advantage.

Concern about the widespread of China's competitive threat, Malaysia offers the world her Multimedia Super Corridor (MSC) (discussed in section 2.5), which brings together a legislative framework, a high capacity global telecommunications and logistics framework, and eco-friendly environment ideal for the growth of multimedia industries. The types of companies encouraged in the MSC are computer hardware and software vendors, system integrators, R&D organisations, and relevant high-tech service providers.

The door is wide open for Malaysian companies to diversify and move high up the value chain by providing total solutions for high technology industries. In this context, domestic companies are expected to benefit, as multinationals shift their outsourcing activities to Asia-Pacific region. Collaboration with MNCs will enable Malaysian companies to develop their own technology and know-how. Malaysia’s investments have attracted MNCs including Intel, AIC semiconductor, Fuji Electrics, Infineon Technologies, BASF Electronic Materials and other established foreign companies (BNM, 2006). A discussion on MNCs operating in Malaysia is provided in section 2.4.

Producers in E&E are continuously producing a variety of innovative products. Innovative products are new or derivative products, which are aimed at new customers and markets, and are designed to be adaptable to changing customer requirements. These products require close and continuous customer contact, have uncertain demand, and their product designs may be unstable (Payne & Peters, 2004; Vonderembse et al., 2006). Due to the characteristics of innovative products, integration with suppliers, manufacturers, distributors, and customers throughout the supply chain are seen as vital strategies in responding quickly to changing customer requirements (Childerhouse et al., 2002; Huang et al., 2002; Huang et al., 2009).

In agile supply chain, producers need to understand customer requirements by interfacing with customers and being adaptable to future changes. It focuses on responding to unpredictable market changes and capitalising on them, through fast delivery and lead-time flexibility. It is a systematic approach that integrates the business, enhances innovation across the company, and forms virtual organisations and production entities based on customer needs (Vonderembse et al., 2006).

2.3 Electrical and Electronics Sub-Sectors

E&E industry in Malaysia has constantly improving its capability since the past few decades to enable the country to gain the skills for the manufacture of a wide range of semiconductor devices, high-end consumer electronics and information and communication technology (ICT) gadgets. Figure 2-3 and Figure 2-4 show the output in different sectors of the electrical and electronics industry in Malaysia for the year 1996 and 2006 respectively.

According to Federation of Malaysian Manufacturers (2008b, 2012), in 1996, electronic components led the E&E industry with 54.4%, followed by consumer electronics, electrical products and industrial electronics. However, in 2011, electrical products contributed the highest to the industry with 49%. The contribution of electronics components has dropped to 36% from 54.4% in 2006, whereas industrial and consumer electronics contributed 6% and 9% respectively. The change in the output structure of E&E is due to the impact of global economic circumstances on the market-oriented domestic economy, and foreign investments in Malaysia.

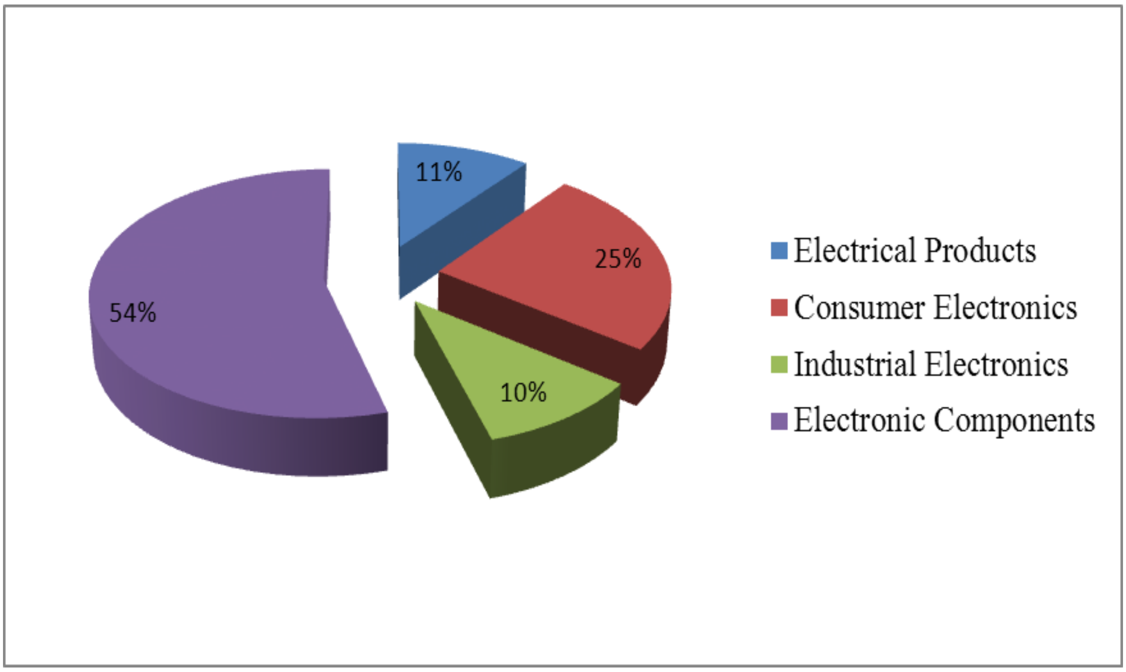


Figure 2-3: Output Structure of the Electrical and Electronics Industry (1996)

Source: Federation of Malaysian Manufacturers (FMM) Directory 2007/08

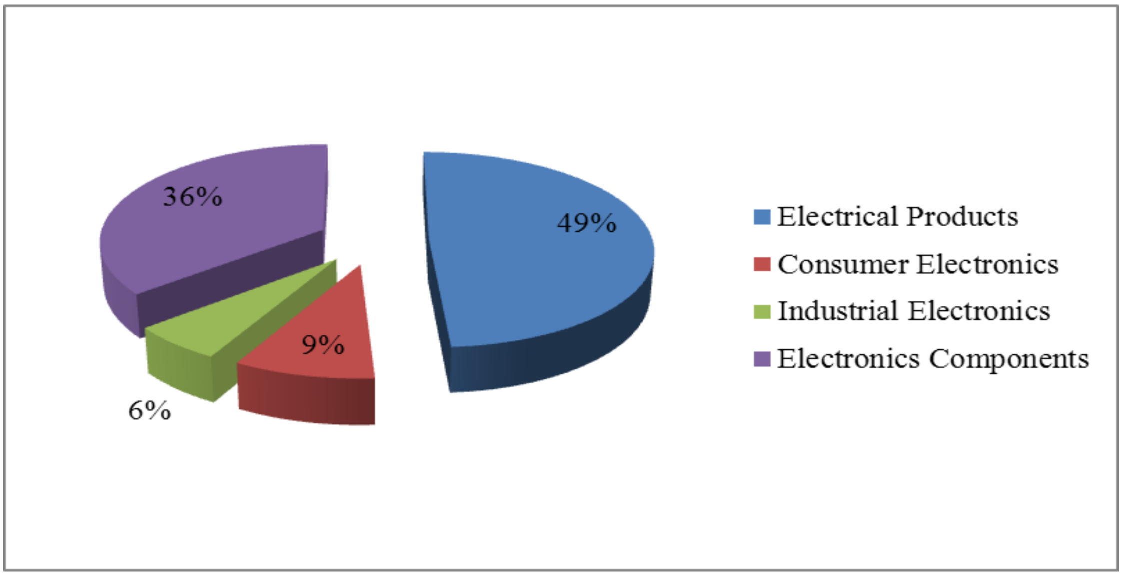


Figure 2-4: Output Structure of the Electrical and Electronics Industry (2011)

Source: Federation of Malaysian Manufacturers (FMM) Directory 2012

The E&E industry in Malaysia comprises four sub-sectors, namely electronic components, industrial electronics, consumer electronics, and electrical products. The following section explains every sub-sector of E&E components.

2.3.1 Electronic Components

The electronic components sub-sector encompasses a wide range of products. These range from semiconductor devices to passive components (such as capacitors, resistors, connectors, inductors, crystal quartz and oscillators) and other components (such as storage media, disk drive parts, PCBs and metal and plastic parts for E&E application).

Malaysia is now among the world's largest exporters of semiconductor devices among developing economies. Since the 1970s, this industry has attracted leading semiconductor companies in microprocessor, microchips, power ICs, linear ICs, opto-electronic devices and other logic and discrete devices (FMM, 2008a). Semiconductor companies in Malaysia have moved beyond basic operations such as assembly, testing and packaging of semiconductors to high value-added activities. Such activities include cutting and polishing of silicon wafers, IC design, and wafer fabrication. Companies that are involved in assembly, testing and packaging, have also moved to complex and advanced packages to cater to the demand for faster, smaller, leadless, high-computing power and multi-functional chips. The global trend in the segment has led to many semiconductor companies undertaking specialisation and adopting new technologies - such as nanotechnology into their manufacturing processes. The growth of the semiconductor industry in Malaysia has also resulted in the development of supporting industries, such as the production of lead frames and bonding wires, metal and plastic parts, specialised machinery and equipment (M&E), moulds, tools and dies, and activities such as failure analysis, prototyping, and burn-in and testing services.

Many semiconductor companies have undertaken R&D and design and development (D&D) activities, especially MNCs. This trend is very encouraging, and is in line with the government's efforts to encourage companies to undertake value-added activities in Malaysia. It is also recognised by existing MNCs that Malaysia has the capacity to host such activities. The implementation of these projects would further contribute to capacity-building and the creation of a pool of skilled and knowledgeable workforce in the industry.

In addition to semiconductor manufacturers, there are more than 190 companies involved in the manufacture of passive components such as capacitors, inductors, resistors, coils, transformers, magnets, quartz crystal and oscillators. Malaysia is developing a strong hard disk component industry. Among the components manufactured are disk media, magnetic heads and disk substrates. Within the electronic components sub-sector, the semiconductor devices industry was the leading contributor in terms of exports for the E&E industry. In 2006, exports of semiconductor devices amounted to RM93.5 billion or 36.1 per cent of total E&E exports. Exports of passive components and other components such as printed circuit boards (PCBs), metal and plastic parts for E&E application amounted to 4.8 billion during the same period.

Electronic components are the most important sub-sector, accounting for 58.7 per cent of the total investment approved in electronics in 2008 (MIDA 2009). The majority of these investments were from foreign sources. The industry is very volatile and is affected by the global economic slowdown. It constituted 91.5 per cent of the total export of electronic components or 38.4 per cent of the total electronics export for 2008.

2.3.2 Industrial Electronics

The industrial electronics sub-sector covers ICT products, such as computer and computer peripherals, telecommunications, optics and photonics, and other industrial electronics products, such as office equipment (copier machines, fax machines, typewriters, calculators and word processors), measuring and test equipment and industrial controllers. This is a fast growing sub-sector driven by rapid developments in digital and wireless technologies.

The markets for more matured products such as personal computers (PCs) and software are also expected to register significant growth. As reported by World Information Technology and Services Alliance (WITSA), the manufacturing sector in Malaysia led ICT spending (RM17.8 billion) in 2006, followed by the consumer segment. Overall IT spending in Malaysia surpassed RM14.4 billion in 2006 or 2.5 per cent of GDP, higher than Thailand (1.6 per cent) but lower than Singapore (4.5 per cent) and U.S.A. (4.5 per cent). ICT expenditure in Malaysia is estimated to cross the RM10 billion mark in 2013, from over RM9 billion in 2012. This could be a response to hyper-competing for growth, speed and economics among businesses in the country (Bernama, 2012).

Major export destinations are USA, the Netherlands, Singapore, People's Republic of China, Japan, Hong Kong, Germany, and Australia. While U.S.A. and Singapore emerged as the major export destinations for telecommunications products, the Netherlands, People’s Republic of China and USA are the major export destinations for computers and computer peripherals. This is largely due to the expansion by established multinational companies (MNCs) in Malaysia to manufacture ICT products for the global market. Some of the major products exported included computers, computer peripherals and telecommunications products.

Currently there are 161 manufacturers of industrial electronic products, including 52 in the manufacture of computers and computer peripherals, 80 in telecommunications equipment, and 21 in optics and photonics products. The majority of the manufacturers in these segments are MNCs. The presence of the MNCs has led to the establishment of local supporting activities, such as specialised machinery and equipment (M&E), moulds and dies, and metal and plastic parts.

2.3.3 Consumer Electronics

This sub-sector includes the manufacture of colour television receivers, audio-visual products such as digital versatile disc (DVD) players and recorders, home theatre, blu-ray, mini disc, electronics games consoles and digital cameras. The industry has undergone restructuring and consolidation due to intense competition from lower-cost producing countries. The sector is represented by many Japanese and Korean companies, which have contributed significantly towards the rapid growth of the sector. The leading companies are now undertaking R&D activities in the country to support their Asia-Pacific markets. Exports of consumer electronics products in 2008 amounted to RM21.5 billion (US$6.9 billion).

The production of consumer electronics, especially audio-visual products, is projected to grow with the trend towards the digitalisation of broadcasting in developed countries. Potential growth areas for Malaysia are in integrated home entertainment networks, digital entertainment systems, home network devices and portable digital video device players. The domestic companies, which are original equipment manufacturers (OEMs) and original design manufacturers (ODMs), will need to take advantage of the growing consumer market to promote their own brand products, through networking with MNCs in the country.

Malaysia’s exports for consumer electronics amounted to RM17.5 billion in 2006 (January – November). The main products exported were sound recorders or reproducers, radio receivers, and television receivers. The major export destinations were Europe, Asia and the Middle East. According to the United Nations Conference on Trade and Development (UNCTAD) Handbook of Statistics 2005, Malaysia was the fourth-largest exporter of consumer electronic products among the developing economies, after Mexico, People’s Republic of China, and Republic of Korea.

2.3.4 Electrical Products

The electrical products sub-sector can be categorised into three segments, namely industrial electrical, electrical components, and household appliances. There are presently more than 238 companies producing a wide range of products. These include household appliances, wires and cables, electrical industrial equipment, and others. Manufacturing activities in the electrical industry have evolved from assembly of components and products of foreign brands to sophisticated higher value-added activities including R&D, design and marketing of local brands for regional and global markets. Major export destinations were ASEAN countries, U.S.A., People's Republic of China, Japan, Hong Kong, the Middle East, Pakistan and India. Major items exported were air-conditioners, electrical appliances, electrical distribution equipment, batteries and electrical accumulators.

The electrical components segment covers products such as cables, wires and conductors, industrial parts and components. There are more than 135 companies producing a wide range of power and telecommunication cables, circuit breakers, motor coils, terminal blocks and thermostats. The major products are wires and cables, manufactured mainly by local companies which cater for big Malaysian companies and other domestic customers. These companies are also exporting to Indonesia, Thailand and other neighbouring countries.

The electrical household appliances segment covers whitegoods such as air-conditioners, vacuum cleaners, washing machines, microwave ovens, and other small home appliances. These include blenders, grinders, toasters, electric kettles and irons. More companies in this segment are concentrating on the production of higher-end products such as multi-feature air-conditioners, power motors and precision parts. Big players in Malaysia have established integrated facilities to undertake R&D and manufacturing activities.

2.4 Multinational Companies (MNCs) in Malaysia

A market-oriented economy, combined with a young, educated workforce, excellent infrastructure, and a government committed to maintaining a business-friendly environment, have been Malaysia's formula for success in attracting investment into its electronics sector. Malaysia is now home to multinational companies from USA, Japan, Europe, Taiwan and Korea, manufacturing products ranging from semiconductor devices to consumer and industrial electronics. The industry has moved up the value chain into the manufacture of high-end products, such as fabricated wafers, mobile phones, telecommunications equipment, notebook computers and servers, and provision of services. Examples of these include design of integrated circuits, prototyping, testing and failure analysis.

Having undergone structural changes over the years, E&E continued to attract substantial domestic and foreign investment, in both expansion or diversification, and new projects. Figure 2-5 depict top foreign investments in E&E in 2006. Japan had investments of RM99 million in new projects, and RM1.4 billion in expansion or diversification projects. The Netherlands invested RM167.8 million in new projects, and RM1.6 billion in expansion projects to manufacture advanced packaged integrated circuits, including a RM1.2 billion project to produce polychlorinated biphenyls (PCB) assemblies. Also included was systems integration for industrial electronics applications, such as computer and computer peripherals, office automation, control panels and testing/measuring equipment, medical equipment, telecommunication/multimedia equipment and mobile phones.

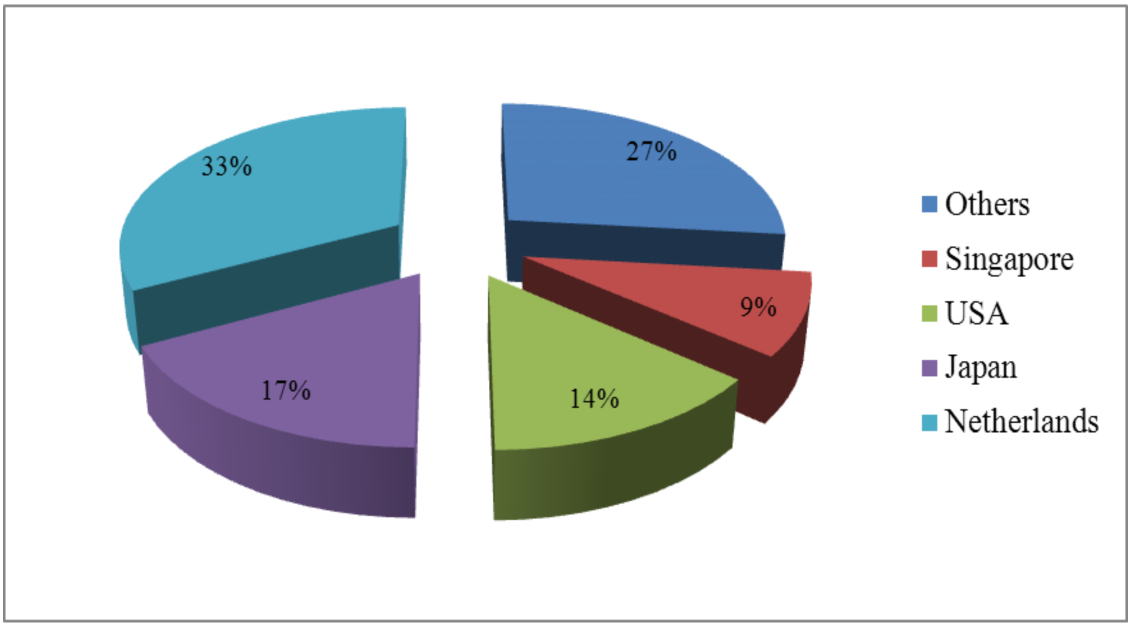


Figure 2-5: Top Foreign Investments in Electrical and Electronics Industry in 2006 (RM Billion)

Source: Federation of Malaysian Manufacturers (FMM) Directory 2007/08

Existing American companies continued to expand and diversify their operations in Malaysia – particularly in E&E – with projects worth RM1.2 billion. Among them are diversification projects to undertake the development and manufacture of digital two-way radios, wireless broadband communications equipment/systems, rechargeable batteries, accessories and parts, an expansion project for the production of PCB assemblies, telecommunications including networking equipment and medical devices, and an expansion project to produce memory and equipment devices.

Singapore invested RM29.1 million in new E&E projects. Expansion/diversification projects totalled RM590.5 million, of which one of the projects was worth RM415.9 million to manufacture PCB assemblies, sub-assemblies, system integration, moulds, tools and repairing activities. Another expansion project for the manufacture of plastic substrates for semiconductor packages, involved an investment of RM125 million. The continued inflow of investment, both in scale and in scope, to expand or build new facilities in Malaysia was attributed to a combination of factors. The main pulling factors were:

- Modern infrastructure, and good international air, sea and cyber linkage;
- Excellent trade ties with most countries;
- English-speaking workforce and highly skilled workers. Salaries of managerial and professional personnel are lower than those in some competing countries;
- Highly trainable Malaysians. This helps to speed up project implementation, and enhance efficiency.

The multinationals involved are foreign-owned, which base their manufacturing operations in Malaysia. Table 2-1 shows samples of established MNCs in Malaysian E&E in 2008. Malaysia has strong foundation in semiconductors and industrial electronics (PEMANDU, 2012). Virtually every leading global firm, from Intel to Texas Instruments, has semiconductor operations in Malaysia. In industrial electronics, Agilent, the global leader in test and measurement, produces a significant percentage of its electronic measurement equipment in the Penang Cybercity zone.

Table 2-1: Multinational Companies in Electrical and Electronics Industry in Malaysia

Product Name	Name of sample companies
Semiconductor	Intel, AMD, Motorola, Agilent, Texas Instrument, National Semiconductor, Fairchild, NEC, Toshiba, Infineon Technologies, STMicroelectronics, FASL, Renesas, ASE Electronics, ChipPAC, MEMC Electronics Material, S.E.H., Hamadatec, SCG Industries, MIMOS, Silterra, 1st Silicon, CHIP DESIGN, Altera Corporation, MIMOS, LEADFRAMES, Dynacraft, M-SMM Electronics, Shinko, Kyushu Matsushita Electric, Mitsui High-Tec, Possehl Besi Electronic, AKN Technology,, BONDING WIRES, Tanaka Electronics, Malaysian Electronics Materials, BURN-IN AND TESTING SERVICES, TS Matrix, KESM Industries, KESP
Passive Components	Matsushita Electronic Devices, TDK, Taiyo Yuden, Nichicon, Chemi-con, MMC Electronics, Murata Electronics, Alps Electric, Koa Denko, Matsushita Electronic Devices, Kamaya Electric, Rohm-Wako, Koa Denko, Coilcraft, Fastron, Epson Precision, HCJ Quartz, NDK Quartz MAGNETS, Shin-Etsu, Epson Precision, VacuuM.S.C.hmelze, ABB
Computers and Computer Peripherals and Data Storage	Dell, NEC, Mitsubishi, BenQ Technologies, Samsung, Jean Motto, Great TV & Computer, Solectron, Tektronix, Instruments Technology, Hewlett Packard, Intel, Solectron, Sanmina-SCI, Jabil, Flextronics, CPI Technology, Likom, Western Digital, Venture, Komag, Fuji Electric, Toyo Memory Technology, Showa Aluminium, Fuji Electric, Komag, Kobe Precision, Seagate, MMI, Eng Teknologi, Seagate, Shin-Etsu, Min Aik, Sankyo, ISC, Sanshin, Hitachi, Sony, BenQ Technologies, TEAC

Source: Department of Statistics, Malaysia 2008

2.5 Multimedia Super Corridor (MSC) Zones in Malaysia

With the existence of Multimedia Super Corridors (MSC), Malaysia has become Asia's most exciting investment location, hosting more than 1000 multinationals, foreign-owned and home-grown Malaysian companies. All of these are focused on multimedia and communication products, solutions, services, and research and development (Ramasamy et al., 2004). The MNCs in this study are those operating in MSC zones and clusters, stretching from Petronas Twin Tower, Putrajaya, Cyberjaya, Technology Park Malaysia, Petaling Jaya Free Trade Zone, Penang Cybercity, Kulim High-Tech. Park and Melaka International Trade Centre. However, many of the manufacturers are located in Penang Cybercity, Technology Park Malaysia and Petaling Jaya Free Trade Zone (Ramasamy et al., 2004; MITI, 2006). These foreign-based companies are different from large local companies, as non-Malaysian shareholders wholly own them. MITI (2009) reported more than 3000 manufacturing multinational companies in Malaysia, of which 659 are in E&E.

Figure 2-6 shows the six established MSC zones for E&E in Malaysia, within three different regions. Penang Cybercity and Kulim High-Tech. Park are in the northern region of Malaysia. Three zones - Petaling Jaya Free Trade Zone, Technology Park Malaysia and Shah Alam Industrial Zone – are in the central region (also known as the Klang Valley region). The southern region is represented by the Melaka International Trade Centre.

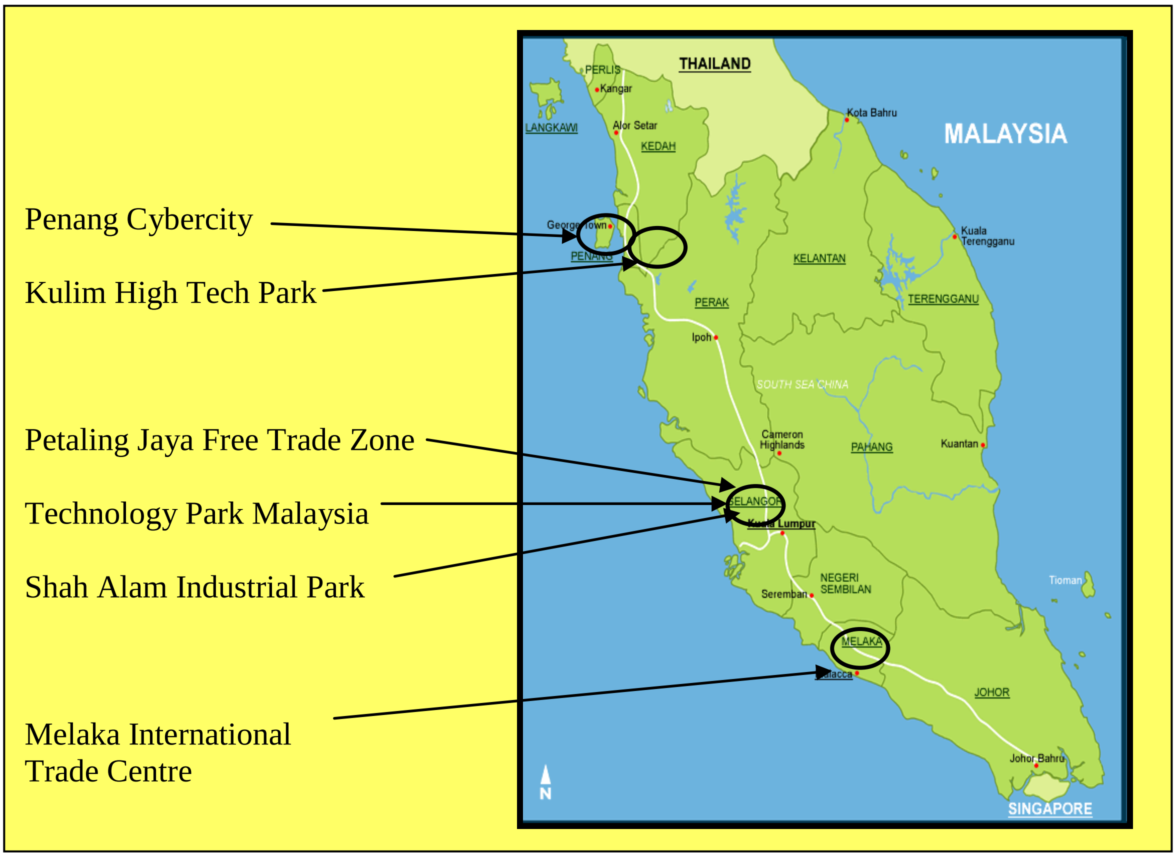


Figure 2-6: Multimedia Super Corridor Zones for Electrical and Electronics Industry in Malaysia

The presence of many large MNCs has created a very sizeable local market for components and supporting industries. The presence of leading electronic manufacturing services (EMS) provides opportunities for local companies to be part of their supply chain in the supply of equipment, materials, parts and components, and dedicated services, such as contract design, burn-in testing, failure analysis and rapid prototyping. In 2006, the government continued to provide incentives to projects engaged in promoting products or activities which will generate spin-offs and economic benefits to the country such as R&D, technology transfer, industrial linkages, social-economic development and employment. Companies engaged in promoting products or activities, which fulfil criteria such as value-added, technology and/or industrial linkages, are eligible for Pioneer Status (PS) or Investment Tax Allowance (ITA).

2.6 Small and Medium Enterprises (SMEs) in Malaysia

This section provides an overview of SMEs in Malaysia. The information for this section is mostly derived from reports published by the Small and Medium Enterprises Corporation (SME Corp.), previously known as the Small and Medium Industries Development Corporation (SMIDEC), the National SME Development Council (NSDC) and the Ministry of International Trade and Industry (MITI), Malaysia.

2.6.1 Profile of SMEs

Malaysian SMEs can be defined according to size, turnover and activity. They can be identified using the definition approved by the NSDC dated 9 June 2005 (NDSC, 2008). The definition assists in categorising SMEs into three broad sectors:

i. the manufacturing sector, including manufacturing-related services and agriculture-based industries;
ii. the services sector, including information and communication technology (ICT), mining and quarrying; and
iii. the primary-agriculture sector (Ndubisi, 2008).

As described in SME Annual Report 2010/11, Malaysia adopted a common definition of SMEs to facilitate identification of SMEs in the various sectors and subsectors (NSDC, 2011). This has facilitated the government to formulate effective development policies and support programmes, as well as provision of technical and financial assistance. An enterprise is considered an SME in each of the respective sectors based on the annual sales turnover or number of full-time employees. Table 2-2 summarises the definitions of SMEs in Malaysia according to the type of sector and the category.

Table 2-2: Definition of SME in Malaysia

Sector	Category	Definition
Manufacturing, manufacturing-related services and agro-based industries	1. Micro-enterprises	Annual sales turnover less than RM250,000 or fewer than 5 employees
	2. Small enterprises	Annual sales turnover between RM250,000 and RM10 million or employees between 5 and 50
	3. Medium enterprises	Annual sales turnover between RM10 million and RM25 million or employees between 51 and 150
Services (including ICT)	1. Micro-enterprises	Annual sales turnover less than RM250,000 or fewer than 5 employees
	2. Small enterprises	Annual sales turnover between RM200,000 and RM1 million or employees between 5 and 19
	3. Medium enterprises	Annual sales turnover between RM1 million and RM5 million and employees between 20 and 50
Primary agriculture	1) Micro-enterprises	Annual sales turnover less than RM250,000 or fewer than 5 employees
	2) Small enterprises	Annual sales turnover between RM250,000 and RM1 million or employees between 5 and 19
	3) Medium enterprises	Annual sales turnover between RM1 million and RM5 million or employees between 20 and 50

Source: National SME Development Council

2.6.2 SMEs in the Manufacturing Sector

SMEs have long been recognised as the backbone to any economy, and have been recognised as an important generator of employment and growth in many countries. Recent globalisation has no doubt revitalised the role of SMEs in the South-East Asian economies. In a recent Asia-Pacific Economic Council (APEC) survey, it is estimated that for most of the member countries, SMEs constitute about 90 percent of total business, and employ between 50 and 80 percent of their workforce (Annonymous, 2001). In most developed countries, SMEs constitute 99 percent of total business enterprises (MITI, 2006); similarly, SMEs constitute at least 98 percent of all enterprises in South-East Asia (Abdullah & Baker, 2000).

This study primarily focuses on the evolution of SMEs in the manufacturing sector, specifically E&E. As a vital component in the Ninth Malaysia Plan (9MP), this sector is expected to generate the robust and sustainable competitiveness of the Malaysian Economy. It is reported that the average growth of manufacturing sector is 6.7 percent per annum, and the manufacturing share of GDP is projected to increase to 31.8 percent in 2010 (EPU, 2006). Based on the analysis by Department of Statistics in the Third Industrial Master Plan (IMP3), 37,866 of active companies in this sector are SMEs, including micro-enterprises, which as of 2003, comprised of 53.4 percent of total SMEs. This was followed by small and medium-sized enterprises, at 38.1 percent and 5 percent, respectively (MITI, 2006)

With the globalisation and the development of a knowledge economy, the key factors affecting the operations of Malaysian SMEs today are innovation, speed, quality, and markets. Global and local value chains are being recognised, while economic integration is being accelerated, even as productivity and costs raise unabatedly (EPU, 2006). SMEs in Malaysia may not match the resources and capabilities of larger companies, but they provide jobs, introduce innovations, stimulate competition, supply to giant companies and in certain cases, produce goods and services more efficiently as effectively as larger companies.

Table 2-3 depicts the contributions of SMEs to the Malaysian Economy from the years 2005 to 2010. The number of SMEs established increases from year to year, representing majority of the businesses in Malaysia, constituting 99.2% of the total firms registered, and providing 59.5% of the total workforce. Amidst the economic recovery in 2010, labour market conditions improved with lower retrenchments, higher vacancies and increased employment growth (NSDC, 2011). As a highly open economy, Malaysia has been affected by the deepening global economic recession. This is recorded in 2009, where the contribution to real GDP decreased by 9.3% from 37% to 27.7%. In 2010 however, the real GDP of the manufacturing sector rose by 11.4% to 39.1% in total.

Table 2-3: SMEs Contribution to the Malaysian Economy

	2005 (%)	**2006 (%)**	**2007 (%)**	**2008 (%)**	**2009 (%)**	**2010 (%)**
No of SME from the total firms registered	96	96.4	97	99	99.2	99.2
Contribution to Total Export	19	29.3	30.7	29	18.5	28.4
Contribution to Gross Domestic Product	32	36	39	37	27.7	39.1
Contribution to Employment	56.8	56.9	58.2	58.9	59.2	59.5

Source: Malaysia National SME Development Council, SME Annual Report 2010/11

SMEs have continuously contributed to the total manufacturing output from the year 2001. In 2010, SMEs in the manufacturing sector contributed the highest value-added growth of 11.8%, from negative growth of 6.6 in 2009, compared to SMEs in other sectors (NSDC, 2011). Table 2-4 shows the value-added growth of SMEs by key economic activity from 2001 to 2010.

Table 2-4: Value Added Growth of SMEs by Key Economic Activity, Annual Change in % (constant 200 prices)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Growth Rate (%)										
Agriculture	3.8	2.1	3.4	8.5	3.6	7.4	-1.4	7.3	2.2	5.0
Mining & Quarrying	-0.3	4.1	1.1	-3.6	-1.1	0.9	9.5	1.4	6.2	5.7
Construction	4.6	5.9	5.2	1.0	4.7	3.2	13.2	3.7	7.2	8.6
Manufacturing	-6.4	3.1	9.9	10.3	5.7	8.3	6.3	0.5	-6.6	11.8
Services	2.2	5.1	2.9	6.8	8.0	7.8	12.8	8.8	2.5	7.1
Total Value Added	**-0.4**	**4.6**	**5.2**	**8.3**	**6.9**	**7.4**	**10.0**	**6.4**	**0.4**	**8.4**

Source: Department of Statistics, Malaysia

2.6.3 Malaysian Government Plans for SMEs

Realising the important role of SMEs, the government of Malaysia has formulated many policies and development plans to support the SMEs in all areas of operations. The strategies that are directed at acquiring technologies to propel SMEs up the value chain include outsourcing, inter-firm linkages, entrepreneurship programs and knowledge skills. The Malaysian Government is continuously strengthening enabling infrastructure to promote development of high-performing SMEs through acculturation of pro-business climate, as well as the provision of a wide array of incentives. These include fiscal measures, financing, skills formation, infrastructure and support systems. Special attention is also being given to expand the scope and coverage of Malaysia’s regional and bilateral arrangements, through free-trade agreements and economic partnership agreements to ensure greater access to markets, trade and investment opportunities.

During the study stage, the Malaysian Government has introduced three long term plans: the Ninth Malaysian Plan (9MP), the Third Industrial Master Plan (IMP3) and the New Economic Transformation Plan.

2.6.3.1 The Tenth Malaysia Plan (10MP)

The Tenth Malaysia Plan (10MP) is a comprehensive blueprint prepared by the Economic Planning Unit (EPU) of the Prime Minister's Department and the Finance Ministry of Malaysia, with approval by the Cabinet of Malaysia. the Plan allocates the national budget from the years 2011 – 2015 to all economic sectors in Malaysia (EPU, 2010). The blueprint was announced on 10 June 2010, unveiled in Parliament by the sixth Prime Minister of Malaysia, Datuk Seri Najib Tun Razak . In 10MP, SMEs in Malaysia are supported through several activities: outsourcing, inter-firm linkages, entrepreneurship programs and knowledge skills (EPU, 2010; NSDC, 2011). Many policies and strategies have been launched to develop a knowledge-based or "K-economy" in all sectors, and to encourage the movement of SMEs into value chain.

2.6.3.2 The Third Industrial Master Plan (IMP3)

The Malaysian Government has formulated three Industrial Master Plans since 1986. The focus of these plans has been to structure the development and transformation of manufacturing in Malaysia (MITI, 2006). The Third Industrial Master Plan (IMP3) covers the period of 2006 to 2020. IMP3 principally focuses on the development of technology and innovation as a key driver of SME growth and competitiveness. It supports SMEs in capitalising their outward investment opportunities, adopting best business practices, and becoming more resilient in a highly competitive climate (MITI, 2006).

2.6.3.3 New Economic Transformation Plan (ETP)

The Economic Transformation Program (ETP) is an initiative by the Malaysian Government to turn Malaysia into a high-income economy by the year 2020. It is managed by the Performance Management and Delivery Unit (PEMANDU), an agency under the Prime Minister’s Department. Launched on September 21, 2010, it is a comprehensive economic transformation plan to propel Malaysia's economy into high income economy. ETP represents a marked change in approach that builds on the Tenth Malaysia Plan, and input from National Key Economic Advisory Areas (NKEAs) (PEMANDU, 2012). It relies heavily on private sector-led growth, describes very specific investments and policy actions, and has a clear, transparent implementation roadmap, with strong performance management.

2.7 Summary

Malaysia is currently focusing to elevate E&E in Malaysia to the higher value chain of E&E supply chain. E&E industrial development has been growing tremendously and in fact is one of the main contributors to the economy of Malaysia. The importance of this study is further deliberated in this chapter. An overview of the domestic electrical and electronics industries, SMEs and MNCs involved in the industry and highlights the importance of this research area. This discussion leads to Chapter 3 on critical antecedents of supply chain relationship, supply chain agility practices and organisational performances underpinning this study.

CHAPTER THREE

LITERATURE REVIEW, RESEARCH FRAMEWORK AND HYPOTHESES

3.1 Introduction

Literature review is the documentation of a comprehensive review of the published and unpublished work from secondary sources of data in the areas of specific interest to the researcher (Sekaran, 2000). The purpose of the literature is to provide reader with comprehensive background for understanding current research topic. Books, journals, conference proceedings, doctoral dissertations and government publications are used to obtain information on the buyer-supplier relationships, agile supply chain and supply chain management. By organizing, integrating, and evaluating previously published material, researcher considers the progress of current research toward clarifying the issue raised.

Section 3.1 briefly introduces the literature reviews by briefly explains the need of reviewing past research for identifying the factors of interests. Following the introduction section, Section 3.2 gives an overview of the theories used as the foundation of this study. Section 3.3 and 3.4 discusses the definitions and perspectives of the key research area. Section 3.5, 3.6, 3.7 and 3.8 details the antecedents of supply chain relationships, supply chain agility practices, operational and financial performance respectively. Section 3.9 explains the research framework of this study. Discussion on research hypotheses is presented in section 3.10. The chapter is concluded with Section 3.11 which summarizes Chapter 3.

3.2 Theoretical Foundation of the Research

This section discusses the two theories which act as the foundations to this study:

3.2.1 Resource-Based View (RBV) of Strategic Alliance

Resource-based view (RBV) of the firm receives much attention in explaining supply chain collaboration (Cao & Zhang, 2011). The resource-based model of competitive advantage suggests that competitive advantage may be sustained by harnessing resources that are valuable, rare, imperfectly imitable, and non-substitutable (Barney, 1991). Firms resources have been defined as all assets, capabilities, organisational process, firm attributes, information, and knowledge controlled by an enterprise that enable the firm to conceive of and implement strategies with the goal to improve its efficiency and effectiveness (Barney, 1991; Daft., 2010). The resource-based perspective has emerged as an important theoretical lens and views firms as a portfolio of resources (Prahalad & Hamel, 1990).

The resource-based view (RBV) of the firm considers the firm as a bundle of resources and capabilities which, when combined become sources of economic rents and sustainable competitive advantage (Barney, 1991). Firms can differentiate themselves in a variety of ways by combining and recombining these resources to take advantage of market conditions. The terms “resources” and “capabilities” are used interchangeably to describe tangible and intangible assets used in the implementation of strategy (Cousins, 2005). RBV argues that firms who only possess marginal resources will, at best, break-even, whereas firms in possession of strategic resources will earn rents or super normal profits. RBV makes a distinction between marginal and strategic resources based on three distinct criteria. Firstly, strategic resources must be valuable, i.e. have potential to realise business opportunities; secondly, they must be rare, i.e. not readily available, be at a premium; finally strategic resources must be non-imitable and non-substitutable, i.e. the resource can only be used for the specific relationship interaction (Barney, 1991; Das & Teng, 2000)

RBV theory perceives the organisation as a basis for competitive advantage and attempts to understand how the organisation can achieve this through the linking of its resources and capabilities. It would appear that organisations operating under a RBV perspective would tend to regard themselves as market differentiators. Accordingly, the development of resources and capabilities may be demonstrated through improvements in various organisational performance metrics. As an example, partnership with suppliers was associated with better delivery performance (Vachon & Klassen, 2006).

Generally, resources can be classified as tangible and possess measurable characteristics, whereas other resources are intangible and possess characteristics that are difficult to measure directly. Resources may be acquired in a simple state and combined together by the firm in distinctive combinations that are certainly not easily traded (Mathews, 2006). Rooted in the resource-based view of the firm, core specificity refers to the degree to which resources contribute to the competitive advantage and superior performance of the firm (Wernerfelt, 1984). The valuableness, rarity, imperfect mobility, non-imitability, and non-substitutability of the core competencies are key elements in terms of the specificity of firms (Penrose, 1959; Wernerfelt, 1984; Teece et al., 1997).

3.2.2 Extended Resource-Based View (ERBV)

Conventional RBV assumes organisations must own or fully control the resources to create value. In the extended resource-based view (ERBV), resource accessibility, the right to employ resources or enjoy their associated benefits, enables organisations to achieve advantages (Cao & Zhang, 2011). The extension of the resource based-view has included the integration of dynamic capabilities (Helfat & Peteraf, 2003).

Lavie (2006) extends the RBV by explaining how interconnected organisations in dyadic collaboration combine external and internal resources endowments to achieve competitive advantages. According to Lavie (2006), the competitive advantage of a focal firm participating in an alliance includes four elements.

i. Internal rent which can be extracted from the focal organisation's own shared and non-shared resources.
ii. Appropriated relational rent which can be extracted only from the shared resources of both partners
iii. Inbound spill-over rent which is generated from the partner's shared and non-shared through knowledge leakage, inter-firm learning, relative absorptive capacity, and internalization of the partner's practices
iv. Outbound spill-over rent results from the transfer of benefits for the focal organization to the partner

The combination of internal rent, appropriated relational rent, inbound spill-over rent and outbound spill-over rent forms private benefits for the focal organisation (Cao & Zhang, 2011). In addition, collaborative advantage is joint competitive advantage and come from a relational rent, a common benefit that accrues to collaborative partners

(Dyer & Singh, 1998). This type of rent cannot be generated individually by either collaborative partner (Yin, 2009; Cao & Zhang, 2011), as resource extension and skills acquisition are common reasons for firms to enter into strategic alliances (Varadarajan & Cunningham, 1995),.

Beyond internal resources, research also suggests that organisations vary considerably in their network resource endowments that influence their competitive advantage (Gulati et al., 2000). This has led to recent conceptual arguments that the resource-based view (RBV) is underspecified and provides only a partial account of competitive advantage in interconnected firms because it takes an atomistic approach (Lavie, 2006). To truly understand the effect of collaborative relations, it is important to view organisations as embedded in social networks (Suseno & Ratten, 2007; Fernández-Pérez et al., 2012), which is known as collaborative networks. Collaborative network is defined as “a collection of loosely connected or closely knit organizations that share resources,” which may help member organizations achieve some strategic objectives (Arya & Zhiang Lin, 2007, p. 698).

According to Arya and Zhiang Lin (2007), extended RBV represents an important complementary perspective to consider along with the RBV in terms of organisational competitive advantage, because network structure and partner characteristics can complement internal resources by allowing some organizations differential access to external resources that enhance their capabilities. Consequently, organisations that possess superior network structures are able to enjoy higher benefits compared with organisations that do not possess such network structures.

3.3 Supply Chain Management

The term supply chain management (SCM) has risen to prominence over the past ten years (Cooper et al., 1997). There are many reasons for the popularity of the concept. Specific drivers may be traced to trends in global sourcing, an emphasis on time and quality-based competition, and their contributions to greater environmental uncertainty (Mentzer et al., 2001; Das, 2011). Organisations have turned increasingly to global sources for their supplies. This globalisation of supply has forced organisations to look for more effective ways to coordinate the flow of materials into and out of the company.

SCM includes managing inter-organisational operations (Saad et al., 2002; Kogg & Mont, 2012). To implement SCM, some level of coordination across organisational boundaries is needed. The key to such coordination is an orientation toward closer relationships with suppliers. Today, organisations in the supply chains in general compete more on the basis of time and quality (Kuei et al., 2010). Getting a defect-free product to the customer faster and more reliably than the competition is no longer seen as a competitive advantage, but simply a requirement to be in the market (Mentzer et al., 2001). Customers are demanding products consistently delivered faster, exactly on time, and with no damage. Each of these necessitates closer coordination with suppliers and distributors.

This global orientation and increased performance-based competition, combined with rapidly changing technology and economic conditions, all contribute to marketplace uncertainty. This uncertainty requires greater flexibility on the part of individual organisations and supply chains, which in turn demands more flexibility in supply chain relationships. As a greater percentage of product value is completed outside the firm, there is a greater need to integrate activities across partners and supply chains to more effectively deliver products (Frohlich & Westbrook, 2001; Das et al., 2006). Growing evidence suggests that integration with partners in the supply chain has a positive impact on operational performance outcomes, such as delivery, quality, flexibility and cost (Devaraj et al., 2007; Swink et al., 2007; Flynn et al., 2010).

3.4 Supply Chain Relationship

Increasing need to improve efficiency and/or productivity and achieve competitive advantage causes organisations to look into collaborative relationships with their supply chain partners (Yazici, 2012). A competitive advantage exists for companies that are engaged in successful long term buyer and seller relationship (Dwyer et al., 1987; Jap, 2001; Schiele et al., 2011). The literature on inter-firm relationships has grown consistently over the past few years (Cousins, 2002). Cousins (2005) stated that academics and practitioners have realized in order for firms to become flexible, adaptable and efficient, they must focus their resources on managing the supply process. This approach has led to firms operating strategies as extended value chain with partners in the supply chain (Hong & Kim, 2012), supplier integration (Prajogo & Olhager, 2012), outsourcing (Tate, 1996; Feng et al., 2011), supplier delegation (Cousins, 1999; Smals & Smits, 2012) and supplier tiering (Hines, 1996; Caniato et al., 2012). The applications of these strategies have caused dramatic changes in the nature of the relationships between firms, from a traditionally widespread range of suppliers towards fewer suppliers and therefore a greater of higher dependency and complex relationships (Cousins, 1999; Lin & Chang, 2012; Yazici, 2012).

Traditional relationships in supply chain network are often described as “arm’s-length” market relationships, characterized by non-specific asset investments, minimal information exchange, and separable technological and functional systems within each firm (Sheu et al., 2006). Traditional relationship has been limited to contact primarily between the buyer and supplier in a supply chain network. Recent studies indicate the need for shifting the view of inter-organizational relationships from arm’s-length to long term (Harrison & Van Hoek, 2008), collaborative relationships (Handfield & Bechtel, 2002; Cao & Zhang, 2011; Zacharia et al., 2011). A basic premise of supply chain management is that close relationships with supply chain members may give the firm and its supply chain members’ competitive advantage over other supply chains by delivering superior value to the customer through reduced cost, increased quality, and superior delivery performance.

Supply chain can deliver some powerful advantages to participating organizations and the collaboration process is worthwhile with coordination efforts and investments leading to enhanced profit performance and the realization of competitive advantages over time (Jap, 2001). Collaboration is about organization and enterprises working together and can be viewed as a concept going beyond normal commercial relationships (Barratt, 2004; Matopoulus et al., 2007). It is the degree to which partners are able to work together in a joint fashion toward their respective goals and has emerged as a key construct in the study of supply chain partnerships given its espoused benefits. Collaboration has been referred to as the driving force behind effective supply chain management and may be the ultimate core capability (Min et al., 2005; Kumar & Banerjee, 2012).

Both academics and practitioners recognize the increasing importance of forming good relationships and collaboration in supply chains (Myhr & Spekman, 2005; Robinson & Malhotra, 2005; Yu & Ramanathan, 2012). The fundamental rationale behind collaboration is that a single company cannot successfully compete by itself. Collaborative supply chain partnerships become the critical linking pins as higher degrees of specialization brings with it an increased need for integration across the overall supply chain. The idea is that when constellations of organizations in one supply chain deliberately collaborate, they can effectively out compete other, less collaborative, supply chains (Myhr & Spekman, 2005).

There is recognition that competition is shifting from a “firm versus firm perspective” to a “supply chain versus supply chain perspective” (Whipple & Frankel, 2000). In response to this shift, organisations seeking competitive advantage are participating in cooperative supply chain arrangements, such as strategic alliances, which combine their individual strengths and unique resources. It is important to explore the importance of partner selection related factors before any investment being made and engaged in various strategic alliance decision-making activities. Thus is it necessary to distinguish between task related factors and partner related factors in analysing partner selection process (Al-Khalifa & Peterson, 1999). According to Al-Khalifa & Peterson (1999), partner related criteria are concerned with variables which are specific to the character, culture and history of the involved partners while task related criteria relate to those variables which focus on operational and performance characteristics. Such variables include a wide range of variables, tangible and intangible, human or non-human.

3.5 Antecedents of Supply Chain Relationships

The following sections discuss three identified antecedents of supply chain relationship and their sub-factors.

3.5.1 Partners Characteristics Capability (PCC)

Success of both domestic and cross-border collaborations may be a function of partner characteristics (Madhok, 1995; Hitt et al., 2000; Beske, 2012). Different types of inter-firm diversity among partners may affect the performance of alliance. Collaborative value creation through alliance requires the simultaneous pursuit of partners with similar characteristics on certain dimensions and different characteristic on other dimensions. Partnering firms need to have different resource and capability profiles yet share similarities in their social institutions (Sarkar et al., 2001). These partner characteristics are important since they help in the formation of relationship capital or the behavioral aspects of an alliance that find expression in relational dynamics such as mutual trust, commitment, and information exchange (Cullen et al., 2000). While long-term relationships and concentrated supply chain partner's portfolios enhance the competitive benefits of process alignment between organisations, it is important to recognize the detrimental effects of these supply chain partner's portfolio characteristics on the competitive benefits of relationship flexibility (Tang & Rai, 2012).

As firms collaborate and combine forces to compete as extended enterprises against other integrated supply chains, risk is linked to the interdependence among supply chain partner (Spekman and Davis, 2004). An integrated supply chain is becoming more easily made as firms acknowledge the cost benefits and the competitive gains that result from supply chain partners working collaboratively to accomplish mutual goals. Supply chain partners begin to focus on those factors and characteristics that link supply chain members by far more than just workflow and logistics. Organizations have gained from achieving high level of transparency and information throughout the supply chain that enables the trading partners to experience the relevant operational transactions of their other supply chain partners. The successes documented at such companies as Dell, HP, and Harley Davidson point to leaner inventories, lower working capital, higher profits and productivity, and better customer service by addressing fundamental issues in selecting partners.

3.5.1.1 Partner Compatibility

Partner compatibility is one of the keys to a successful partnership (Bowersox, 1990; Sarkar et al., 2001). In a successful partnership, each party must clearly understand its partner's business needs from the outset (Tate, 1996; Kelly et al., 2002). Involving both partners in long term strategy planning is an integral part of the partnership process. Partners must work with clearly spelled out ground rules and procedures. In addition, the specific role of each partner must be spelled out, understood and agreed to (Tate, 1996). Pansiri (2008) observes that like relationships between people, organization relationships begin with courtship, where organizations attracted to each other seek to discover their compatibility. This is ranked as one of the main ingredients for a successful alliance because the sophistication and expression of the strategy will not work if relationship is not workable (Hagen, 2002).

The degree of compatibility among partner firms has been found to be an important predictor of the success or failure of strategic alliance (Shamdasani & Sheth, 1995; Liou et al., 2011). Compatibility covers the array of issues including broad historical, philosophical, and strategic grounds, values and principles, and hope for the future (Kanter, 1994; Brouthers et al., 1995; Sobhi, 2012), cultural and organizational issues and the extent to which an alliance partner has complementary goals and shares similar orientations that facilitate coordination of alliance activities and execution of alliance strategies (Shamdasani & Sheth, 1995; Wong et al., 2005; Wu et al., 2009; Cheung et al., 2010; Lin, 2012).

Shared values are similar but broader concept. Morgan and Hunt (1994, p. 24) define shared values as “the extent to which partners have beliefs in common about what behaviors, goals and policies are important, unimportant, appropriate or inappropriate, and right or wrong”. Although the wider concept of shared values has some appeal, it seems too broad to be effectively operationalized. Norms are rules by which values are operationalized. Heide and John (1992) suggest that norms differ in their proscribed behavior toward collective versus individual goals. Individual goals create norms of competitive behavior, whereas relational exchange norms are based on the expectation of mutuality interest, essentially prescribing stewardship behavior, and are designed to enhance the well-being of the relationship as a whole. Most likely, mutual goals encourage both mutuality of interest and stewardship behavior that will lead to achieving mutual goals. Perhaps it is easier to measure the degree to which the partners share the same goals than it is to measure values and norms (Wilson, 1995).

3.5.1.2 Goal Congruence

Goal congruence or mutual goals are the degree to which partners share goals that can only be accomplished through joint action and maintenance of the relationship (Wilson, 1995; Cavusgil & Deligonul, 2012). Goal congruence between supply chain partners is the extent to which supply chain partners perceive their own objectives are satisfied by accomplishing the supply chain objectives (Cao & Zhang, 2011) . It is the degree of goal agreement among supply chain partners (Angeles & Nath, 2001). In the case of true goal congruence, supply chain partners either feel that their objectives fully coincide with those of the supply chain, or, in case of disparity, believe that their goals can be achieved as a direct result of working toward the objectives of the supply chain (Lejeune & Yakova, 2005).

Goal congruence among supply chain partners provides strong reason for relationship continuance. Wilson et al., (1995) suggest that mutual goals influence performance satisfaction, which, in turn, influences the level of commitment to the strategic alliance. Strategic alliances are known to be risky. Potential partners may be a lot better or worse than the company at the strategic alliance formation (Cavusgil & Deligonul, 2012). Goal assessment is seen as an important criteria in choosing partners besides complementary skills and cooperative cultures (Brouthers et al., 1995).

A successful alliance must be based on compatible goals. The ideal is when strategic goals converge, while competitive goals diverge (Lorange & Roos, 1991). Ambiguity must be avoided, as should coordinated activities. According to Lynch (1990) clarity of focus is vital, ambiguous goals, fuzzy directions, and uncoordinated activities are the primary causes of failure of cooperative ventures. To avoid the pitfall of ambiguity or different goals, partners should make sure they have synchronous goals to begin with, and then review what has been accomplished in terms of their original goals.

3.5.1.3 Corporate Reputation

The increasing importance of corporate reputation has, in recent years, been recognized within the strategic management literature by a proliferation of conceptual and empirical work (McWilliams & Siegel, 2000; Hillman et al., 2001). Reputation is a precious intangible asset (Branco & Rodrigues, 2006). Corporate reputation is viewed as a solution for asymmetric information regarding firms. It increases investors' confidence that firms will act in ways that are reputation-consistent.

Strategy scholars see reputation as assets and as mobility barriers (Rose & Thomsen, 2004). When faced with lack of information on a product or on a firm's initiative, stakeholders rely on the firm's reputation to judge its products or its intentions (Schnietz & Epstein, 2005). Reputation may derive from the unique internal features of the company, which describes the history of the company's interactions with its constituents. Established reputations impede mobility and produce returns to firms because they are difficult to imitate (Barney, 1991). Partner related criteria are concerned with variables, which are specific to the character, culture and history of the involved partner. One of the critical and important factors of partner selection in strategic partnership identified by Al-Khalifa and Peterson (1999) and Chen et al. (2012) is related to reputation of the alliance partners.

3.5.1.4 Resources Complementarities

One of the reasons organisations enter strategic alliances is to access inimitable skills or resources and to penetrate new markets (Lin & Darnall, 2010). However, resource complementarities are crucial to strategic alliance success (Dyer & Singh, 1998; Jiang et al., 2008; Yan & Yang, 2012). As noted by Love and Roper (2009), resource complementarities involve both uniqueness and symmetry. On one hand, complementarities determine the mix of unique and valuable tangible and intangible resources available to achieve strategic objectives, thus enhancing competitive viability of the alliance (Wu et al., 2009; Cheung et al., 2010).

Alliance partners are motivated to associate themselves with partners with their required resources. Effective inter-organizational alliances are associated with selection of appropriate partners since choosing partners who possess necessary resources and with whom strategic and economic incentives can be aligned is a critical determinant of partnering success (Sarkar et al., 2001; Jiang et al., 2008). Sarkar et al. (2001) suggests that performance is likely to be enhanced when firms are able to manage the paradox involved in choosing a firm that is different, yet similar. Consistent with the RBV, alliances allow firms to trade strategic resources across their boundaries (Nielsen & Gudergan, 2012). When these resources are complementary, desirable performance arises due to synergistic effects. Thus complementary resources and capability profiles may enhance the value generated in alliances, as do similarity in the social institutions of the partners (Chung et al., 2000).

Organisations enter into a strategic alliance when the combined resources can create excess value and advantages (Bretherton & Chaston, 2005). By combining their resources and capabilities with those of other companies, organisations can initiate projects that they could not have successfully done alone. For a firm attempting such a project, the consideration of the resource complementarity becomes an important issue (Burgers et al., 1993; Hess & Rothaermel, 2011; Chen et al., 2012).

3.5.2 Alliance Management Capability

Supply chain is a network of operating processes while network is viewed as a system of business processes. Process efficiency is the likely objective in buyer and seller relationships that entail close coordination between buyers and suppliers (Saeed et al., 2005). The need for adaptation and synchronization of process in these types of relationships is high. The need to integrate these processes also arises to maximize flow, focus on end customer and compete on a range of different competitive priorities. Nesting the capabilities of these processes creates power and synergy for the network. If different links in the supply chain are directed towards different competitive priorities, then the chain will not be able to serve the end-customer (Harrison & Van Hoek, 2008).

Effective management of buyer-supplier relationships is an important research domain (Monczka et al., 1994; Tan, 2001). Process efficiency is the likely objective in buyer-supplier relationships that entail close coordination between buyers and suppliers. The need for adaptation and synchronization of process in these types of relationships is high (Saeed et al., 2005). Firms either need to keep buffers or slack resources to compensate for lack of information or develop mechanism for effective coordination. Keeping buffers or slack resources, however, may add to operating costs.

3.5.2.1 Commitment

The establishment of business relationships and successful marketing recognizes commitment as a vital element. A high level of commitment provides a context in which both parties can achieve their individual and joint goals without raising the spectre of opportunistic behaviour (Mohr & Spekman, 1994). Commitment refers to the willingness of partners to make an effort on behalf of the relationship and the belief of the committed party that the relationship is worth working on to ensure that it lasts indefinitely (Morgan & Hunt, 1994). Commitment as an implicit or explicit pledge of relational continuity between exchange partners (Dwyer et al., 1987). It refers to the willingness of trading partners to exert effort on behalf of the relationship that can be sustained in the face of unanticipated problems. It suggests a future orientation in which partners attempt to build a relationship that can weather unanticipated problems. In other words, partnering relations are a long-term nature.

It is believed that committed customers will offer more value to their suppliers as their contribution to the on- going relationship. There might also be more benefits for the suppliers as the customers want the suppliers to stay competitive and financially healthy in the long run. Also collaborative innovation activities are possible as both sides try to develop future-oriented mutually beneficial exchanges. For the same reason it can be assumed that the customers offer the suppliers insights into their markets, technology and network (Walter & Ritter, 2003).

3.5.2.2 Trust

In strategic alliance, when knowledge is exchanged, firms have to options: they can try to protect themselves with contracts or they can resort to trust (Hitt et al., 2008). Invariably, not every contingency can be anticipated at the outset of an alliance so trust will play a key role in alliance management. Trust plays a key role in any organizational relationship (Morgan & Hunt, 1994; Crotts & Turner, 1999). Trust is defined as the expectation that the relationship partner is willing and able to act in the best interest of the relationship or the belief in the supplier's honesty, goodwill, and competence (Handfield & Bechtel, 2002; Sahay, 2003; Kwon & Suh, 2005). Trust exists when a party believes that its partner is reliable and benevolent (Heikkilä, 2002).

In management literature there has been a noticeable increase in the importance of trust in different forms of inter organizational relationships (Sahay, 2003), and the need for trust between partners has been identified as an essential element of buyer-supplier relationships (Crotts & Turner, 1999; Cullen et al., 2000) Interpersonal trust facilitates coordination efforts, and complimentary capabilities facilitate both effort and investments (Jap, 2001). A number of academic studies have identified trust as a key partnership characteristic which fosters collaborative behaviours (Morgan & Hunt, 1994). A buyer and a supplier who trust each other are more likely to openly share detailed cost breakdowns with each other. Open access to such information enables partners to identify and manage inefficiencies and potential redundancies, whereby the total costs incurred in supply–chain relationships can be reduced.

3.5.2.3 Cooperation

Cooperation is defined as the willingness to undertake complimentary actions to achieve mutual goals (Brouthers et al., 1995; Palmatier et al., 2007). Organizations are forming partnerships to enhance their capabilities to improve product quality, innovation and market reach (Mohr & Spekman, 1994; Bello et al., 1999; Duffy & Fearne, 2004). Regardless whether the strategic alliance is a joint venture, research consortium, marketing agreement or supply chain partnership, members from the organizations need to work together collaboratively (Parise & Casher, 2003; Sweeney & Webb, 2007).

Mohr and Spekman (1994) suggest that organizations cannot develop enduring competitive advantages without working cooperatively with their suppliers and distributors. In strategic alliance, organizations working cooperatively with partners are seen to be able to reduce the complexity of their environment and gain more control over environmental factor (Eisenhardt & Schoonhoven, 1996). Strategic alliances are perhaps a special case where sustained organisational interactions between two or more firms may lead to patterns of coevolution between these firms that depend largely on the process of cooperation (Doz, 1996).

3.5.2.4 Conflict Management

Managing conflict in supply chains has emerged as an important topic in supply chain management (Chen & Paulraj, 2004) . Conflict refers to the process that begins when one party perceives that the other has frustrated, or is about to frustrate, some concern of his (Kozan et al., 2006). Conflict is almost inevitable in buyer-supplier relations as a consequence of two firms trying to maximize their returns from the business relationship (Reve & Stern, 1979).

Conflict management derives its importance due to several industry trends currently in place. Increase in strategic outsourcing by firms, globalizations of markets, increasing reliance on suppliers for specialized capabilities and innovation, reliance on supply networks for competitive advantage, and emergence of information technologies that make it possible to control and coordinate extended supply chains (Fisher, 1997; Das & Teng, 2001; Lee, 2002). Reducing conflict and promoting stability is one of the objectives of collaborative partnership (Chopra & Sodhi, 2004; Kozan et al., 2006; Hitt et al., 2008).

Supply chain risk management can be viewed as a strategic management activity in firms given that it can affect operational, market and financial performance of firms. Organisational efficiency and performance are enhances when strategy to reduce uncertainty takes into account context and environmental realities (Cheung & Chuah, 1999). In the case of supply chain, context can be interpreted to refer to sources of risk, magnitude of risk and its relationship to business objectives, an threat of disruption in supply chains (Kozan et al., 2006). Supply chain disruptions can materialize either inside or outside a supply chain. Wagner and Bode (2008) pointed out that financial default of a supplier and an earthquake that destroys production capacity are situations with completely different attributes and therefore have different effects on the supply chain. Thus, it is vital for organisations to design conflict management measures and strategies to be agreed and implemented amongst supply chain members (Narasimhan & Talluri, 2009).

3.5.3 Process Capability

Agile supply chain is a new strategic concept intended to improve the competitiveness of firms for innovative products. Supported by agile manufacturing, the processes are characterized by buyer–supplier integrated process for product design, manufacturing, marketing, and support services. This needs decision-making at functional knowledge levels, stable unit costs, flexible manufacturing, easy access to integrated data, and modular production facilities. Agile supply chain requires enriching of the customer, co-operating with competitors, organizing to manage change, uncertainty and complexity, and leveraging people and information (Gunasekaran, 1999).

Supply chain is a network of operating processes while network is viewed as a system of business processes. Process efficiency is the likely objective in buyer and seller relationships that entail close coordination between buyers and suppliers (Saeed et al., 2005). The need for adaptation and synchronization of process in these types of relationships is high. The need to integrate these processes also arises to maximize flow, focus on end customer and compete on a range of different competitive priorities. Nesting the capabilities of these processes creates power and synergy for the network. If different links in the supply chain are directed towards different competitive priorities, then the chain will not be able to serve the end-customer (Harrison & Van Hoek, 2008).

Effective management of buyer-supplier relationships is an important research domain (Monczka et al., 1994; Tan, 2001). Process efficiency is the likely objective in buyer-supplier relationships that entail close coordination between buyers and suppliers. The need for adaptation and synchronization of process in these types of relationships is high (Saeed et al., 2005). Firms either need to keep buffers or slack resources to compensate for lack of information or develop mechanism for effective coordination. Keeping buffers or slack resources, however, may add to operating costs.

3.5.3.1 Information Technology

Central to collaboration is the exchange of large amounts of information along the supply chain, including planning and operational data, real time information, and communication. Information is seen as the 'glue' that holds together the business structures that allow supply chains to be agile in responding to competitive challenges. The backbone of the supply chain business is IT which is used to acquire, process, and share information among supply chain partners for effective decision making (Sanders & Premus, 2002; Paulraj et al., 2008).

The idea that information technology (IT) is a source of competitive advantage and fundamental to a firm's survival and growth is well-established (Prajogo & Olhager, 2012) . Through information technologies, coordination costs and the risks associated with inter-organizational relations can been reduced. Information technology allows buyers and suppliers to communicate directly over data-rich, easy-to-use information channels that reduce coordination costs (Lewis & Talalayevsky, 2000). Indeed, many organizations feel it necessary to engage in information technologies system such as

B2B e-commerce. If they do not, those competitors that do make use of such technologies threaten to outpace them in efficiency gains and hence jeopardize their market position (Kaefer & Bendoly, 2004).

The information systems and technologies in supply chains represents one of the fundamental elements that link the organizations of a supply chain into unified and coordinated system (Handfield & Nichols, 1999). The introduction and utilization of integrated information systems for managing the supply chain would not only enhance quality as well as reduce delivery times and costs, but also enhance the company's competitive position (Yusuf et al., 2004; Swafford et al., 2008; Narasimhan et al., 2009).

3.5.3.2 Innovation

Innovation is a new way of doing something or "new stuff that is made useful" (McKeown, 2008). Innovation from an organisational perspective is the successful implementation of creative ideas within an organisation (Amabile et al., 1996). It may also refer to incremental and emergent or radical and revolutionary changes in thinking, products, process, or organizations. In economics the change must increase value, customer value, or producer value. In the organisational context, innovation may be linked to performance and growth through improvements in efficiency, productivity, quality, competitive positioning and market share (Guan & Ma, 2003; Chen & Paulraj, 2004).

Growing attention is being paid to innovation as a key success factor in a firm's sustainable competitive advantage (Narayanan, 2000). Innovativeness refers to the organisation's capacity to engage in innovation: that is, introduction of new processes, products, or ideas in the organisation (Hult et al., 2004). This capacity to innovate is among the most important factors influencing organisational performance.

The concept of technological innovation refers to any incremental or radical change in technology embodied in product and process. Moreover, it includes the change in value activities such as service and administration (Sher & Yang, 2005). From a resource-based view of the firm, innovative capability, among other capabilities, is seen as critical to a firm achieving strategic competitiveness (Conner, 1991). Guan and Ma (2003), reveal export growth is closely related to the improvement of innovation capability dimensions, except manufacturing capability. Thus, improvement of innovation capability is most important in the period of rapid technological change as in electrical and electronics industry. Competitive advantages in the global market are derived from the ability to develop and commercialize new technologies more rapidly than other firms, and from the ability to promote and facilitate the creation and dissemination of technological innovations (Guan & Ma, 2003; Zheng et al., 2009).

3.5.3.3 Flexibility Proficiency

Flexibility is defined as increasing the range of products available, improving the firm's ability to respond quickly, and achieving good performance over a wide range of products (Upton, 1995). The problem of definition is felt to a significant extent; along with the difficulty of a conceptual unification of the terminology there is also the great variability in the fields of application, of the concept of flexibility (De Toni & Tonchia, 2005).

From a general point of view, flexibility is a capability of adaptation/change (De Toni & Tonchia, 2005). Flexibility can be considered as an important precondition for value creation through business relationships. Firms are required to increase its adaptation capability to respond to demand changes. Customer-specific adaptations are all those change in the supplier's resource deployment which are only done for the customer in question in order for better match the supplier's offering to the customer's problem (Brennan and Turnbull, 1997; Hallen et al., 1991).

In today's competitive global market, enterprises must possess the capability to design and deliver innovative products with great value to customers in a timely matter. Each organization must focus on its own strong area where it will be uniquely competitive. Hence, all partners should ruminate about where and how values are created, and what contribution they can make based on their core competencies (Chiang & Trappey, 2007). In creating core competencies, the emphasis should be on adaptability to change in the business environment and the proactive way of approaching to market and customer needs through newly evolved cooperation methods such as strategic partnership (Sharifi & Zhang, 1999; Agarwal et al., 2006). Naylor et al. (1999) argue that while both lean and agile systems emphasize supply integration, waste reduction, and lead time compression, they differ most importantly in their emphasis on flexibility for market responsiveness. A key characteristic of an agile organization is flexibility (Narasimhan et al., 2006; Swafford et al., 2008).

3.6 Supply Chain Agility Practices

A firm's ability to respond to competitive challenges and to sustain its competitive advantage is a key element of success in today's global marketplace (Teece et al., 1997; Cagliano et al., 2004). Being responsive is an increasingly important skill for firms in today's global economy, thus firms must be agile. A firm's level of supply chain agility represents the strength of the interface between the firm and its market. Supply chain agility represents the speed with which a firm's internal supply chain functions can be adapt to marketplace changes (Swafford et al., 2008). It is captured by manufacturing lead time, new product introductions, development cycle time, delivery capability and responsive to market changes. Using perspective that competencies are derived from capabilities (Teece et al., 1997), agility is a capability derived from the synergy among flexibility in the supply chain functions (Sharifi & Zhang, 1999).

Competitive pressures force manufacturers to continuously improve the provision of products and associated services desired by customers. Many manufacturers now have begun adopting practices that increase their ability to rapidly respond to changes in customer demand (Cheung et al., 2010). For these, superior responsiveness has become a key to competitive advantage. In short, many manufacturing firms are becoming relatively more agile (Inman et al., 2011). This is a fundamental characteristic of agile entities: the ability to thrive and prosper in a competitive environment of continuous and unanticipated change. It has been shown that agility can assist organisations in responding in an opportune manner to market volatility and other uncertainties, therefore allowing organisations to establish a competitive position (Mapes et al., 1997; Swafford et al., 2006, 2008; Li et al., 2009).

3.7 Organizational Operational Performance

Supply chain management (SCM) seeks to enhance competitive performance by closely integrating the internal functions within a company and effectively linking them with external operations of suppliers, customers, and other channel members (Kim, 2006). The benefit of such supply chain integration can be attained through efficient linkage among various supply chain activities, and the linkage should be subject to the effective construction and utilization of various supply chain practices for an integrated supply chain.

With many markets becoming volatile and difficult to predict, the focus of supply chain management has shifted from the idea of cost as an order winner to responsive as the market winner (Christopher & Towill, 2002). Agile supply chain are faced with the pressure of providing responsiveness whilst keeping cost at a low level (Baker, 2008). The dynamic nature of market environments explains why agility is an essential element of a firm's long term success and growth. Agility is the ability to cope with unexpected challenges, to survive unprecedented threats of business environment, and to take advantage of changes opportunities (Sharifi & Zhang, 1999). Achieving supply chain agility is a function of other abilities within the organization; specifically supply chain flexibility and information technology integration. Partnership developed between multinational companies and small medium enterprises may influence the firm's operational performance and financial performance in terms of their supply chain agility practices , supply chain flexibility and competitive business performance (Swafford et al., 2008).

A broader conceptualization and more effective business performance should include indicators of operational performance in addition to those of financial performance. This is mainly because non-financial measures can overcome the limitations of just using financial performance measures (Bourne et al., 2000; Medori & Steeple, 2000). There are many advantages of using non-financial measures, including the facts that non-financial measures are more timely than financial ones (Chen and Lee 1995), they are more measurable and precise, they are consistent with company goals and strategies, and non-financial measures change and vary over time as market needs change and thus tend to be flexible (Medori & Steeple, 2000; Pun & White, 2005).

While financial performance measures are more likely to reflect the assessment of an organisation by factors outside of the organisation's boundaries, operational measures reflect more directly to the efficiency and effectiveness of the operations within the organisation. These categories of performance reflect competencies in specific areas of supply chain including cost, delivery speed and reliability, quality, and flexibility (Cheung et al., 2010; Nyaga et al., 2010). They also mirror the two arguably most important dimensions of supply chain performance: efficiency, the ability to provide a service at a lowest possible cost, and customer service, the ability to accommodate customers' special requests (Fawcett and Clinton 1996). Operational performance measures provide a relatively direct indication of the efforts of the various supply chain constructs.

3.8 Organizational Financial Performance

A common measure of business performance is referred to as the financial performance because it centres on the use of simple outcome-based financial indicators that are assumed to reflect the fulfilment of the economic goals of the firm (Palmatier et al., 2007; Lambert & Schwieterman, 2012). Financial performance has been the dominant model in empirical strategy research (Venkatraman & Ramanujam, 1986; Thomas et al., 1991). Typical of this approach would be to examine such indicators as sales growth, profitability, earnings per share, and so forth (Cao & Zhang, 2011; Yang & Crowther, 2012). These measures have been widely used in previous researches because they are primary yardsticks for most stakeholders (Chen & Paulraj, 2004; Flynn et al., 2010). Effectiveness of supply chain collaboration should be reflected on such financial metrics.

To survive and prosper in today's highly competitive environment, organisations are increasingly engaging in strategic alliances with their partners in the supply chain. Organisations can improve their financial performance when they seek to internalize the resources and skills of their strategic alliance partners (Cao & Zhang, 2011).

3.9 Research Framework

Drawing from the literature review discussed above, a research framework has been developed and is shown in Figure 3-1.

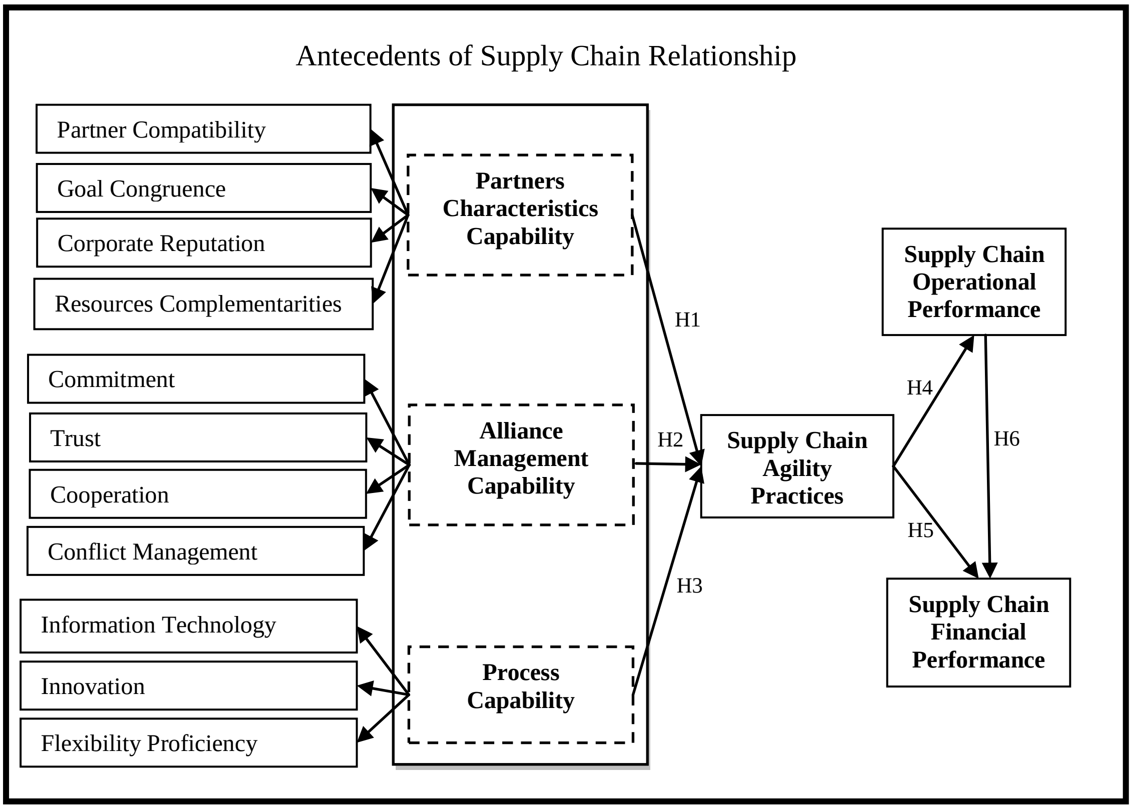


Figure 3-1: Research Framework of the Study

The main variables of the study are:

Partner's Characteristics Capability (PCC), also known as the organization's characteristics; this refers to an organization's distinctive competence in specific ability(Austin, 2010). Organizations must develop their unique characteristics and abilities to adapt compatibly with partners in the supply chain. This study measures PCC using two factors: partner compatibility (Cambra-Fierro et al., 2011) and resources complementarities (Wassmer, 2010).

Alliance Management Capability (AMC), or customer relationship management; this is the mechanism to organize business partnership between two or more organizations in the supply chain with the objective to minimize or avoid conflict (Zajac et al., 2011).

This study analyses AMC in terms of two major factors: cooperation leverage between organizations involved and conflict management mechanisms.

Process Capability (PC) refers to as the operations capability; this is the capability of designing products, transforming raw materials into final goods and planned delivery to the customers (Liao et al., 2010). It influences the strengths of supply chain agility. This study measures PC using three factors: information technology capability (Tallon & Pinsonneault, 2011), innovation capability (Hess & Rothaermel, 2011) and flexibility proficiency (Liao et al., 2010) .

Supply Chain Agility Practices (SCAP) or SCM practices which relate to supply chain activities in agile environment. They include the organization's internal and external operations activities, such as manufacturing process and managing demand and delivery. This study analyses SCAP in terms of measurement items to enhance operational efficiency in agile environment and strategic performance.

Supply Chain Operational Performance (SCOP) refers to the functioning of the organizations as a result of SCAP. It is the non-financial criteria of organizational performance. Essentially it is the short-term objectives of SCM to enhance productivity and reduce inventory. In this study SCOP is measured by the operational level of business performance in terms of delivery performance, order cycle time, forecast accuracy and order processing accuracy.

Supply Chain Financial Performance (SCFP) refers to the functioning of the organizations as a result of SCAP and SCOP. It is the financial criteria of organizational strategic performance. The long term SCM objectives are to increase market share and integration of supply chain for all members of the supply chain. Typically, SCFP in this study is measured by financial indicators such as market share, profitability and sales growth.

3.10 Research Hypotheses

Working from the literature review and conceptual framework, this section focuses on developing hypotheses that relate to three antecedents of supply chain relationship. This study develops six hypotheses to be investigated and analysed in the process of answering the research question addressed in Chapter 1.

The first hypothesis proposes that in agile environment, partner's characteristics capability (PCC), rooted from the resource-based view of the firm enhances the implementation of supply chain agility practices among partners in the supply chain. A successful strategic alliance depends substantially on effective cooperation between partners, since the motives for entering into an alliance is to exploit the benefits of cooperation (Das & Teng, 1998). However, given the best possible level of cooperation, strategic failures do exist due to incompetence of partners. Das and Teng (1998) further mention that partner selection based on the general characteristics of partners is consistently significant for organization to set their operational objectives based on the orientation of the alliance. Thus, SCAP can be increased by increasing partner's characteristics capability within the supply chain relationship.

Organizations are beginning to obtain breakthrough benefits from their collaboration initiatives (Fawcett et al., 2007). That means organizations should work together to achieve a level of agility beyond the reach of the individual company (van Hoek et al., 2001). The failure of many alliances can easily be traced to partner selection at the planning stage, because it is at this stage where risk minimization should be addressed (Das & Teng, 1998).

In choosing appropriate partners, strategic alliance research identifies compatibility and capability as criteria for successful pre-selection of alliance partners (Kanter, 1994; Chen et al., 2008). These factors are perceived as important elements of alliance success. While these issues have been examined differently in diverse inter-organizational contexts, not much work has been done to investigate empirically how partner characteristics influence the implementation of SCM practices in agile environment. From this perspective, the first hypothesis is:

H1: Partners' Characteristics Capability has a significant positive effect on supply chain agility practices

The second hypothesis demonstrates that the success implementation of supply chain agility practices can be achieved with efficiency in managing the alliance between supply chain partners. Researcher defines alliance management capability as a firm's ability to manage strategic alliances using the resource-based view. Definition of supply chain management implies an increased reliance on closer buyer and supplier relationships. Relationships between buyer and supplier in the supply chain must be effectively managed for the benefits to be realized and effective alliance management begins with selecting the right partner in the supply chain (Ireland et al., 2002).

Effective alliance management is however critical for alliances' benefits to realize (Ireland et al., 2002). Thus building relationship with partners in the supply chain requires organizations to select the right partners, develop suitable alliance design, adapt and manage the relationship as needed appropriately. Building on the recent theoretical notion that a firm's alliance management capability can be a source of competitive advantage (Dyer & Singh, 1998) and (Ireland et al., 2002), this study empirically examine the effect of alliance management capability on supply chain agility practices.

It is believed cooperation and conflict management mechanism are central to for international strategic relationship between MNCs and SMEs in Malaysian electrical and electronics industry. Organizations differ in organizational cultures and management philosophies; they differ in their routine policies and procedures. When the partners are from different national cultures, these differences are magnified and commonly generate misunderstandings (Cullen et al., 2000). In addition, differences in partner companies in conjunction with cultural differences can greatly inhibit the alliance's durability and its success. If the capability to manage alliances is heterogeneously distributed across organizations and difficult to imitate, an organization's alliance management capability has the potential to create an organization-level competitive advantage (Barney, 1991; Ireland et al., 2002). This opinion suggests that alliance management capability may significantly correlate with supply chain agility practices as proposed in hypothesis two:

H2: Alliance Management Capability has a significant positive effect on supply chain agility practices

The third hypothesis shows that an organization's process capability (PC) will influence its supply chain agility practices (SCAP). This study defines process capability as manufacturing capability in the context of the resource-based view (RBV) of the firm (Teece, 1986; Barney, 1991; Rumelt, 1997; Nath et al., 2010) by studying how organizations develop their process capabilities and resources in pursuit of better performance and competitive advantage. This relationship may also be explained from the resource-based view competitive advantage (Kim, 2009).

The resource-based view (RBV) of the firm (Barney et al., 2001) suggests that it develops organizational resources into capabilities that help the organization manages its environment and enhance performance (Day, 1994), and emphasizes how effectively a firm uses and combines resources, including financial, technological, human, and physical assets. Such combined resources can generate unique and hard-to-imitate capabilities that contribute to competitive advantages.

Capabilities in functional areas of the firm, such as manufacturing, contribute to the development of deployable resources for the firm (Schroeder et al., 2002). Their positive contributions to performance may also confer advantages compared to competitors, alone or in combination with resources in other functional areas or partners in the supply chain through strategic collaboration or alliance.

Several approaches for developing manufacturing capabilities have been articulated. Hayes and his colleagues (Hayes & Wheelwright, 1984.; Hayes, 1985; Hayes & Jaikumar, 1988; Hayes et al., 1988; Hayes & Pisano, 1994) and Clark (1996) have consistently argued that manufacturing capabilities should play an important role in how firms compete in product markets, and that firms must continually develop these capabilities. Ferdows and De Meyer (1990) focused on endowing manufacturing processes with an expanding set of capabilities by pursuing a specific sequence of improvement initiatives.

Thus this study will investigate the role of process capability through the following hypothesis with its three identified factors; information technology, innovation capability and flexibility proficiency.

H3: Process Capability has a significant positive effect on supply chain agility practices

The fourth hypothesis examines the impact of supply chain agility practices on organizational performance particularly the non-financial measures or operational performance. Supply chain agility has been defined as, "an externally focused capability that is derived from flexibilities in the supply chain processes" (Swafford et al., 2006, p. 172). Supply chain agility practices in this study is defined as the outwardly focused capability derived from a competencies (Prahalad & Hamel, 1990; Teece et al., 1997) of the organization's SCM practices.

SCM practices involve a set of activities undertaken in an organization to promote effective management of its supply chain (Koh et al., 2007). Competitive supply chains therefore are able to integrate supply and demand through collaboration and deliver significantly improved performance (Barratt, 2004). SCM includes a set of approaches and practices to effectively integrate suppliers, manufacturers, firms and the supply chain as a whole in a cohesive and high-performing business model (Chopra & Meindl, 2007).

In fact, the SCM approach has been engaged by many organizations to improve their organizational performance and enhance competitiveness in the marketplace (Chin et al., 2004). SCM practices implemented to achieve superior supply chain performance (cost, quality, flexibility and time performance) require internal cross functional integration within a firm and external integration with suppliers or customers to be successful (Cagliano et al., 2006; Swink et al., 2007; Fuente et al., 2008; Nurmilaakso, 2008; Van der Vaart & Van Donk, 2008).

This study proposes that SCAP have a direct impact on the operational performance of both MNCs and SMEs. SCM practices are expected to increase an organization's operational performance through flexibility, reduced lead time, reduced inventory level and forecasting. As noted earlier various SCM practices have an impact on various aspects of operational performance. This leads to the following hypothesis:

H4: *Supply chain agility practices have a significant positive effect on supply chain operational performance*

The fifth hypothesis focuses on the effect of supply chain agility practices on strategic level of organizational performance or the financial performance. Supply chain agility is a measure of how rapidly the supply chain can respond (Swafford et al., 2006) The objective of an integrated supply chain strategy is to synchronize the requirements of the final customer with the flow of materials and information along the supply chain in order to reach a balance between high customer service and cost (Vickery et al., 2003) to achieve the final performance outcome. SCM practices influence not only operational performance but also financial performance of an organization. In this study, financial performance is viewed as the final performance outcome. SCM practices are expected to enhance the organization’s sales, market share and profitability.

The supply chain relationship framework developed in this study proposes that SCM practice has a direct impact on the overall financial performance of an organization (Shin et al., 2000). SCM practice is expected to increase an organization's market share, return on investment (Prasad & Tata, 2000; Shin et al., 2000), and improve overall competitive position (Carr & Pearson, 1999; Stanley & Wisner, 2001). For example, strategic supplier partnership has been reported to yield organization-specific benefits in terms of financial performance (Stuart, 1993; Lamming, 1996; Stuart, 1997; Carr & Pearson, 1999; Tan et al., 1999; Stanley & Wisner, 2001). The bottom-line impacts of SCM practices have been confirmed by real-world examples. A recent survey finds that organizations that are best at SCM hold a 40% to 65% advantage in their cash-to-cash cycle time over average organizations and the top organizations carry 50% to 85% less inventory than their competitors (Sheridan, 1998). Based on the above it is hypothesized that:

H5: *Supply chain agility practices have a significant positive effect on supply chain financial performance*

The six hypothesis focuses on the significance of SCOP on SCFP of the organization. Previous studies have measured organizational performance relying on both financial and non-financial criteria. The relationship between non-financial and financial measures of organizational performance has long been discussed in organization and strategy literature. Non-financial indicators such as innovation performance (Lloréns et al., 2003) and other non-financial performance indicators may be the ultimate aim of any business organization and important indicator in evaluating the impact of SCM practices on SME performance (Demirbag et al., 2006). These opinions suggest that organization financial performance can be improved by increasing operational performance of the organization as practicing supply chain management (SCM) has become an essential prerequisite for staying competitive in the global race and for enhancing profitably (Power et al., 2001; Moberg et al., 2002; Tan et al., 2002; Childerhouse & Towill, 2003).

Researchers have also emphasized that competitive supply chain in the market might be characterized by efficient use of chain resources which would lead to lower product cost, better product quality, faster response and therefore eventually greater market share (Koh et al., 2007). In addition, Kim (2006), mentioned supply chain operational capabilities can lead to the development of performance measurement. Improving the operational measures such as delivery performance, order cycle time, forecast accuracy and order processing accuracy may improve the organization’s financial result (Kaplan & Norton, 1992). Thus, generic operational performance may be the predominant influence on financial performance in the context of agile supply chain. From this perspective, the sixth proposed hypothesis is:

H6: *Supply chain operational performance has a significant positive effect on supply chain financial performance*

3.11 Summary

The first section of this chapter discusses on the literature review related to three antecedents of supply chain relationship: partner's characteristics capability (PCC), alliance management capability (AMC) and process capability (PC), supply chain agility practices (SCAP), supply chain operational (SCOP) and supply chain financial performance (SCFP). Table 3-1 summarises the antecedents of supply chain relationship and their sub-factors derived from the extensive literature search.

Table 3-1: Summary of Supply Chain Relationships Constructs and Sub-Factors

Constructs	Sub-Factors
Partner's Characteristics Capability	• Partner Compatibility • Goal Congruence • Corporate Reputation • Resources Complementarities
Alliance Management Capability	• Commitment • Trust • Cooperation • Conflict Management
Process Capability	• Information Technology • Innovation • Flexibility Proficiency

A number of studies have shown how PCC, AMC and PC can affect business performance. Most of the existing literature also analyses the impact of SCM practices of organizational performance, including strategic and operational performances. This study however attempts to identify these capabilities as the supply chain relationship antecedents from RBV theory in agile environment between MNCs and SMEs in electrical and electronics industry in Malaysia. Most studies demonstrates that capabilities are the most important assets and resources that firms can develop, as they demonstrate the organization's uniqueness and by developing such capabilities, organizations can be more prepared to face the real-world market competition.

This chapter also focuses the discussion on research framework and hypotheses. This chapter has established a research framework that presents six hypotheses of interest relating to PCC, AMC, PC, SCAP, SCOP and SCFP. It also discusses on the establishment of research hypotheses. This chapter also discussed the development of research instruments used in this study, to critically analyse and justify the source and functions of instruments that measure the six constructs of the study. The discussion leads to the Chapter 4 on survey design and implementation.

CHAPTER FOUR

RESEARCH METHODOLOGY: SURVEY DESIGN AND IMPLEMENTATION

4.1 Introduction

Chapter 3 outlined the development of a research framework and six hypotheses, based on the review and analysis of extensive literature relevant to this study. This chapter presents the primary research methodology that focuses on survey design and implementation to examine the theoretical model established in Chapter 3, and to address the research question and objectives discussed in Chapter 1.

Following the introduction in Section 4.1, Section 4.2 gives an overview of the research paradigm of this study. Section 4.3 discusses the research design and stages, while Section 4.4 justifies why empirical and quantitative survey methodology has been used. Section 4.5 discusses the research instrument development, while Section 4.6 deliberates on population, sampling and units of analysis used in this study. Section 4.7 provides discussion on the survey development process including literature review, pre-test, pilot study prior and larger-scale survey. Section 4.8 presents the ethical consideration undertaken in this thesis, and lastly, Section 4.9 summarizes the chapter before proceeding to Chapter 5.

4.2 Research Paradigm

As discussed in Chapter 3, this study embodies three main research emphases. The first is to discover the critical antecedents of supply chain relationships between MNCs and SMEs in Malaysian electrical and electronics industry. Secondly, a set of hypotheses regarding the relationships between variables of supply chain relationships namely partners' characteristics capability (PCC), alliance management capability (AMC) and process capability (PC) are to be empirically tested. Thirdly, the study is aimed to disclose the impact of supply chain relationship constructs on supply chain agility practices, and the impact of agility practices on organisational performance. In order to adequately address the research question, it is significantly important to reflect upon the suitability of particular research strategies and examine their application to the problems at hand.

To determine the research paradigms and approach undertaken in this study, prior relevant scientific theories were examined and taken into consideration. The framework shown in Figure 4-1 was used in constructing the methodology applied. The methodology demonstrates linkages between methods and their related paradigms as proposed by Healy and Perry (2000).

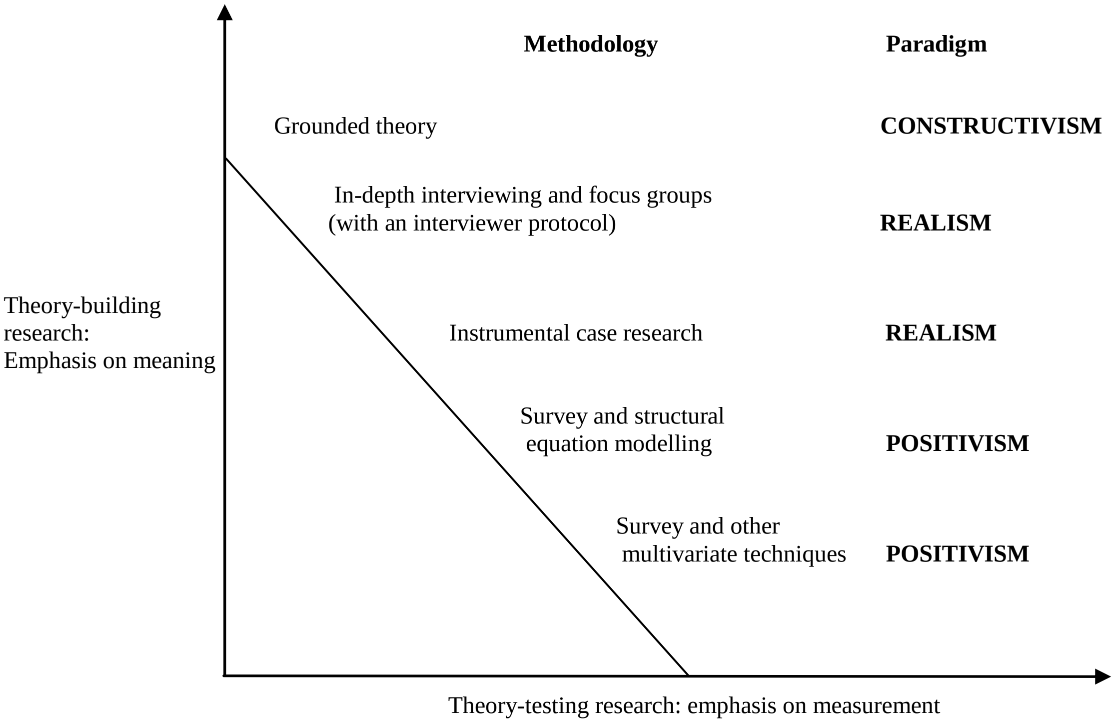


Figure 4-1: A Representative Range of Methodologies and Their Related Methodologies (Healy and Perry, 2000)

The positivist paradigm shown in Figure 4-1 above uses exploratory literature review, personal interviews, surveys, multivariate analysis and structural equation modelling. The use of quantitative methods to perform theory and present model testing authenticated the existence of positivism (Sobh & Perry, 2006). The examination of relationships between the antecedents of supply chain relationships on supply chain agility practices and organizational performance, through hypotheses, tests indicated the use of the positivism paradigm. Specifically, it was demonstrated by the measurement method of the supply chain relationship constructs that follow an assumption requiring the measurement result to be a single apprehensible reality (Healy & Perry, 2000). The summary of the paradigm elements proposed by Sobh and Perry (2006), shown in Table 4-1, supports this proposition.

Table 4-1: Four Scientific Paradigms

	Paradigms			
	Positivism	***Constructivism***	***Critical Theory***	***Realism***
Ontology	Reality is real and apprehensible	Multiple local and specific “constructed” realities	“Virtual” reality shaped by social, economic, ethnic, political, cultural, and gender values, crystallized over time	Reality is “real” but only imperfectly and probabilistically apprehensible and so triangulation from many sources is required to try to know it
Epistemology	Findings true- Researcher is objective by viewing reality through a “one-way” mirror	Created findings- researcher is a “passionate participant” within the world being investigated	Value mediated findings- researcher is a ‘transformative intellectual” who changes the social world within which participants live	Findings probably true- researcher is value aware and needs to triangulate any perceptions he or she is collecting
Common methodologies	Mostly concerns with a testing of theory. Thus mainly quantitative methods such as: survey, experiments, and verification of hypotheses	In-depth unstructured interviews, participant observation, action research, and grounded theory research	Action research and participant observation	Mainly qualitative methods such as case studies and convergent interviews

Note: Essentially, ontology is “reality”, epistemology is the relationship between the reality and the researcher and methodology is the technique used by the researcher to discover that reality
Source: Based on Perry at al. (1999), which itself was based on Guba and Lincoln (1994) from which the quotations come

Source: Sobh and Perry (2006)

4.3 Research Design and Stages

This study examines the critical antecedents of supply chain relationships between MNCs and SMEs in Malaysian electrical and electronics industry. The study employs a sequential exploratory design, which is characterised by quantitative data collection and analysis. Figure 4-2 depicts the research design, and stages involved in this study.

The first stage involved an exploratory study, with an extensive literature review as the primary method. The exploration of literature was directed towards reviewing all relevant existing models, and collecting information from past studies about antecedents of supply chain relationships, supply chain agility practices, and supply chain operational and financial performance. The investigation of supply chain relationship is focused on partner's characteristics (PCC), alliance management (AMC) and process capability (PC). The results from the literature review were used to develop a conceptual model, formulate the research question, objectives and hypotheses. Constructs chosen in the model were operationalised, and referred to in developing the research instruments. The first stage was finalised by preparing the sampling frames for the data collection process.

Stage Two involved data collection and three sequential activities: pre-test, pilot study, and main survey. Pre-test and two pilot studies were undertaken before the main survey was carried out, to ensure optimal research measures. The results yielded from these two activities were used to refine measurement items used in the questionnaire in terms of content validity and reliability. The main survey involved the distribution of survey questionnaires to the identified respondents. The number of the required sample was derived from the requirement for performing structural equation modelling, and was based on sampling method used.

Stage Three involved analysing and processing data collected using statistical methods, including confirmatory data analysis (CFA), structural equation modelling (SEM) and SEM multigroup analysis. Drawing on the existing literature of supply chain relationships, this thesis developed a theoretical model to answer the research question identified in Chapter 1, and test the hypotheses developed in Chapter 3. Punch (2003) suggests that the methods used to conduct research should be in line with the research questions. Therefore, a quantitative approach is the appropriate method carried out in this thesis to test the hypotheses, and then to answer the research questions.

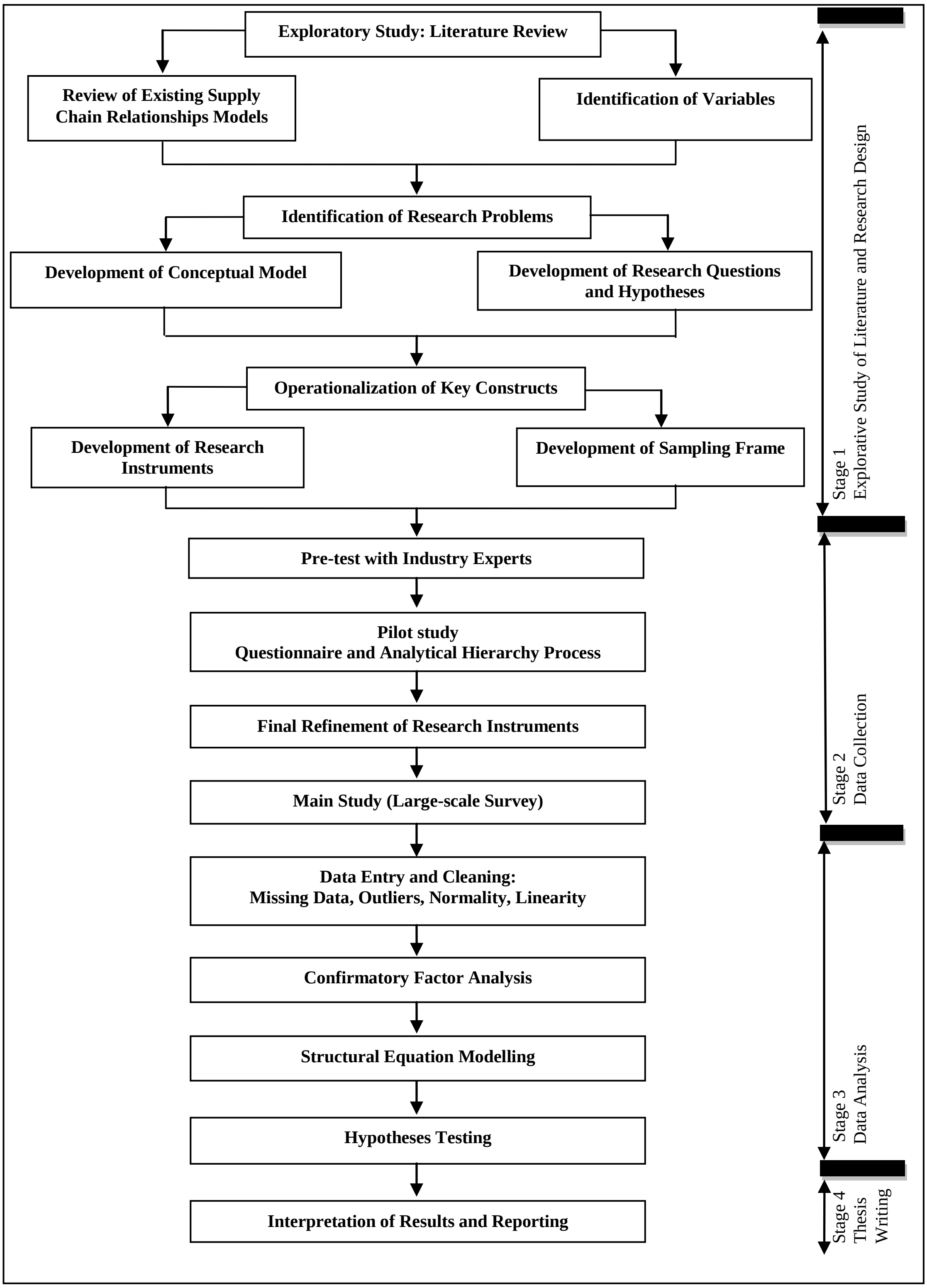


Figure 4-2: Research Design and Stages

According to Neuman (2011), quantitative methods are described as organised methods for combining deductive logic with precise empirical observations of individual behaviour, in order to discover and confirm a set of probabilistic causal laws that can be used to predict general patterns of human activity. Amaratunga et al.(2002) highlight that applying quantitative research helps the researcher to establish statistical evidence on the strengths of relationships between both exogenous and endogenous constructs. They also emphasise that the statistical results provide directions of relationships when combined with theory and literature. Quantitative methodology can verify hypotheses and provide strong reliability and validity (Cavana et al., 2001; Amaratunga et al., 2002).

Extensive research has been conducted in similar studies of buyer and supplier relationships employing this methodology (Agus, 2001; Wisner, 2003; Corsten & Felde, 2005; Cousins et al., 2008). Since the objectives of this study are to empirically investigate casual relationships among the underlying constructs, this methodology has been deemed to be appropriate (Clarke, 1999; Cavana et al., 2001; Neuman, 2011).

4.4 Justification of an Empirical Research Design

An empirical research design is the focal point of this study. It provides a structure for data collection and analysis to address the proposed research problems. Therefore, the most important step is the selection of the research design to develop the study, as this will affect the range of dimensions for the research process (Bryman & Bell, 2007). In general, eight elements of research design are relevant such as purpose of the study (Cooper & Schindler, 2006; Sekaran & Bougie, 2010). These are:

i. types of investigation;
ii. extent of researcher's interference;
iii. study setting;
iv. unit of analysis:
v. sampling design;
vi. time horizon;
vii. data collection method; and
viii. measurement of variables

Table 4-2 lists the dimensions of the research design for this study. The development of these dimensions follows the guidelines provided by Emory (1985), Malim and Birch (1997), and Sekaran and Bougie (2010).

Table 4-2: Dimensions of the Study's Research Design

Study Dimension	Description
Purpose of the study	Hypothesis testing
Type of investigation	Correlation; causal relationship
Extent of researcher interferences	Minimal
Study setting	Non-contrived; field study
Unit of analysis	Organizational level
Sampling design	Simple random sampling, 500 MNCs and 500 were SMEs targeted
Time horizon	One shot, cross-sectional study
Data collection method	Quantitative method (Drop and collect)
Measurement of variables	Element definition, interval scale (five-Likert Scales), nominal and dichotomous scale

The research design of this study is based on quantitative research strategy through hypotheses testing, as the purpose of this study is to understand and explain the relationship of six hypotheses that may in part explain the success of a supply chain relationship in agile environments. The strategy emphasises the quantification of the collection, measurement and analysis of the data (Bryman & Bell, 2007). This strategy relies on quantified evidence used to test hypotheses that have been discovered from the literature, which results in the formulation of theoretical conclusions for particular research domains (Veal, 2005). This study focuses on testing the hypotheses to explain the variance in the dependent variable. A quantitative strategy based on survey data has been chosen over the qualitative methods used in many studies (Bryman & Bell, 2007), as it emphasizes the details of the research design, research methods and analysis approaches. This is consistent with this study's attempt to discover the predictability of PCC, AMC and PC as they relate to the agility practices and organisational performance.

Consideration should also be given to selecting an accurate investigation type. It could be derived from either a causal or a correlation perspective. A causal study examines the causes and effects of one or more problems, including market factors. However, the complex, costly and time-consuming nature of causal studies (Hair et al., 2010) makes this approach impracticable for this study. As this study ultimately focuses on correlation effects in that it seeks to identify important variables associated with the problem (Sekaran & Bougie, 2010), uses the organisational level as its unit of analysis, and involves minimal interference into the activities of the organisations studied, the co-relational approach is appropriate.

The extent of researcher interferences in an organisation relates to the type of investigation used in this study. Interference can be divided into three levels: minimal, moderate and excessive (Sekaran & Bougie, 2010). As mentioned above, this study is a co-relational investigation; therefore it interferes only minimally in the activities of the organisational studied. Finally, this study is set for non-contrived and analysed organizations, using aggregate data.

4.4.1 Data Collection Method

The primary data collection method for this study is quantitative: a survey questionnaire. The questionnaire was designed applicable to MNCs and SMEs in the Malaysian electrical and electronics industry. This stage of this study involved the main research activity designed to obtain the data needed to empirically validate the proposed model, as well as to answer the research question and achieve the research objectives. Drawing on the existing literature of supply chain relationships, this thesis developed a theoretical model to test the research question identified in Chapter 1, and the hypotheses in Chapter 3. Survey methodology was employed in this study. A survey is a snapshot of companies at a certain point in time, and they have frequently employed in organisational studies.

As described in Chapter 1, the proposed theoretical model was evaluated using a sample of MNCs and SMEs supply chain, production, operations and procurement managers. For this purpose, a survey methodology was found to be the most appropriate tool to collect the data for the following five reasons. First, it is designed to deal more directly with the nature of respondents' thoughts, opinions and feelings (Shaughnessy &

Zechmeister, 1997). Second, it is an effective tool especially when the investigator does not require or has little control over behavioural events (Yin, 2009). Third, it provides an accurate means of assessing information about the sample, and enables the researcher to draw conclusions about generalising the findings from a sample of responses to a population (Creswell, 2009). Fourth, it is more concerned about causal research situations (Hair et al., 2003). Finally, it is considered useful because it is quick, inexpensive, efficient, and can be administered to a larger sample (Zikmund, 2003; Sekaran & Bougie, 2010).

This study used a drop-and-collect method, involving the distribution of self-administered questionnaires to identified respondents who comprised the sample population. Despite impressive technological advances, there is still a very real need for fast, reliable and perhaps most importantly, low-cost research methods (Brown, 1993; Maclennan et al., 2011). It involves hand-delivery and subsequent recovery of self-completion questionnaires, though several other variants exist. According to Brown (1993), by combining the strengths and avoiding the weaknesses of face-to-face and postal surveys, drop-and-collect provides a fast, cheap and reliable research tool. The sample asked to participate as research respondents was derived from the population through the use of a sampling frame, which is explained in the following section. The drop-and-collect method may reduce the risk of bias from non-participation, interviewer effects, and social desirability effects, by harnessing the benefit of face-to-face recruitment and follow-up, while leaving participants to complete the survey alone and in their own time (Maclennan et al., 2011).

The database of identified respondents that includes directors and senior managers of manufacturers in electrical and electronics industry in Malaysia was obtained from the Federation of Malaysian Manufacturers (FMM). The final survey questionnaire contains eighteen demographic and thirty-six content questions. To facilitate a quick response, the final questionnaire was translated into Bahasa Melayu, the Malaysian native language. This is to give options and ensure clear communication to the respondents, especially the SMEs. The final questionnaires are presented in Appendix 2 (English version).

4.4.2 Time Horizon

This study uses one-shot or cross-sectional data, in which samples are analysed once in time, as opposed to a longitudinal study (Emory, 1985; Zikmund, 2003; Graziano & Raulin, 2007; Sekaran & Bougie, 2010). Cross-sectional surveys are the most popular form of survey (Zikmund, 2003). The information designed for cross-sectional analysis can be completely descriptive or involve testing relationships amongst population characteristics (Graziano & Raulin, 2007). This type of study is less expensive and time-consuming than a longitudinal study (Kumar, 2005). Cross-sectional surveys offer opportunity to assess relations between variables (Reis & Judd, 2000), therefore this study approach is utilised.

4.4.3 Measurement of Variables

In general, there are four types of scales for quantifying information: nominal, ordinal, interval and ratio (Bryman & Bell, 2007; Sekaran & Bougie, 2010). This study uses nominal and interval scales. The instruments in Part 1 to 5 of the questionnaire mainly use nominative scales. The five-point Likert Scale is used exclusively for the instruments except Part 6 on the descriptive respondents' profile (refer to questions in Appendix 2).

The Likert Scale was chosen in this study. It is commonly used in similar research, which allows respondents to express either a favourable or unfavourable attitude toward the object of interest (Cooper & Schindler, 2006). The scale is also easy to develop, reliable and applicable to both in respondent-centred and stimulus-centred studies (Emory, 1985). Most social science research uses either a five-point or a seven-point Likert Scale; there are no significant differences between the two. In this study, a five-point scale was applied to give respondents options to express their opinion. Section 4.5.2 justifies the reasons for using the five-point Likert Scale.

4.5 Research Instrument Development

This section rationalises the research instruments that will be used in the survey questionnaire. The operationalisation of the instruments is discussed as follows:

4.5.1 Operationalisation of Constructs

In this study, the information required to empirically confirm the conceptual framework was acquired through the operationalisation of supply chain relationship antecedents. More specifically, the construct indicating supply chain relationship was investigated through the measurement of supply chain relationship (SCR) antecedents. To facilitate the development of scale items, an initial list of potential questions was drafted, by drawing on previous literature. A set of questionnaires containing items to measure each variable was prepared for this purpose.

This study employs the measurement of SCR to discover contributing factors to supply chain relationship in agile environments between MNCs and SMEs. Items capturing information about SCR antecedents were associated with partner characteristic capability (PCC), alliance management capability (AMC), and process capability (PC). Each antecedent was represented with a set of items. PCC was represented with partner compatibility (PC) and resource complementarities (RC). AMC was represented with cooperation (CO) and conflict management (CM) while PC was represented with information technology (IT), innovation (IN), and flexibility proficiency (FP).

This study will also examine the impact of Supply Chain Agility Practices (SCAP) on Supply Chain Operational Performance (SCOP) and Supply Chain Financial Performance (SCFP). Supply chain agility practices involve a set of activities undertaken in an organisation to promote effective management of its agile supply chain. The literature is replete on the dimensions of SCM practices from a variety of perspectives. Organisational performance in this study is measured by financial and non-financial metrics. Financial metrics are the long term strategic objective of any organisation. Meanwhile, the non-financial metrics are the organisational objectives at the operational level. In this study, the measurement items for the operational performance were adapted from previous studies, in the context of agile supply chains.

For this study, four to seven items were used for each of the key constructs. This resulted in a total of 52 questionnaire items to be answered by the respondents. The summary of the instruments in Part 1 to Part 5 of the questionnaire are thoroughly discussed in section 4.7.2. Part 6 of the survey questionnaire includes questions on the demographic profile of the respondents.

In many studies, organisation and respondent background are considered obligatory questions on a survey. Thus, this study asked questions related to the background of the organisation and operations management with the purpose of:

i. Understanding the respondents' profiles, as they are the primary sources for this study;
ii. Analysing the background of the organisation and accomplishments;
iii. Developing related information that may be used as part of this study.

However, this study avoids asking for sensitive information, in the interests of protecting the confidentiality of the respondents. The questions are formed to comply with the requirement of RMIT University's Human Research Ethics Committee. There are 14 questions covering 8 types of general characteristics. These are:

i. The role of the respondent in the organisation;
ii. Managerial experience;
iii. Type of organisation;
iv. Quality assurance;
v. Location;
vi. Organisation category;

vii. Years of establishment; and

viii. Buyer/supplier list.

Questions designed in this section are referenced to Tan (2007), Sahakijpichan (2007), Hashim and Ahmad (2008) with some modifications to apply in Malaysian context.

Part 6 of the survey questionnaire uses fixed-alternative questions and open-ended responses (Zikmund, 2003) to identify the background and nature of business management of the participant organisation. Zikmund (2003) addresses two types of fixed-alternative questions to be considered: simple-dichotomy questions and determinant-choice questions. These questions comprise descriptive data which need to be analysed with descriptive statistics. Table 4-3 summarises the type of question asked in Part 6 of the questionnaire.

Table 4-3: Type of Questions for Respondents Profile

General Characteristics	Item	Type of Question
Role of Respondent	1i) What is your position in the organization	Determinant-choice
	1ii) Which department are you attached to	Determinant-choice
	2) Education level	Determinant-choice
Managerial Experience	3i) Do you have managerial experience?	Simple dichotomy
	3ii) If yes, how many years of managerial experience you have in production/supply chain/operations management?	Determinant-choice
	3iii) Do you have managerial experience in electrical and electronics or ICT industry?	Simple dichotomy
	3iv) If yes, how many years of managerial experience you have in production/supply chain/operations management in electrical and electronics or ICT industry?	Determinant-choice
Type of Organization	4) Types of organization (based on paid up capital):	Determinant-choice
	5) What category of product your organization produces?	Determinant-choice
Quality Assurance	6) Types of certification your organization registered to	Determinant-choice
Location	7) Location of business operation	Determinant-choice
Organization Category	8) Number of employees in your organization:	Determinant-choice
	9) Number of years that your organization has been operating?	Determinant-choice
	10) Last 3 Financial Year's Average Annual Sales	Determinant-choice
	11) What is the role of your organization is in this business alliance	Simple dichotomy
Years of Establishment	12) For how many years has the business alliance been operating?	Open-ended response
Buyer/Supplier List	13) If your organization is the buyer in the business alliance, name top 5 organizations that your organization buys from	Open-ended response
	14) If your organization is the supplier in the business alliance, name top 5 organizations that your organization supplies to:	Open-ended response

4.5.2 Scaling and Measurement

For the purpose of identifying critical antecedents of supply chain relationships, a five-point Likert Scale was used. The Likert Scale is the most widely used method of scaling in the social sciences today. It has been shown that a five-point scale is just as good as any, and that an increase from five to seven to nine points on a rating scale does not improve the reliability of the ratings (Elmore & Beggs, 1975). It is sufficient to maintain an acceptable level of reliability, while allowing greater flexibility in choosing data-analysing techniques for both metric and non-metric models, and it is likely to provide a better measure of the intensity of participants' attitudes or opinions.

Further, the use of a Likert-type scale is recommended for research involving supply chain practices, concerns and performance measurement (Tan, 2002; Yusuf et al., 2004; Swafford et al., 2006) and the implementation of structural equation modelling (SEM) as a data-collection method (Hair et al., 2010; Tabachnick & Fidell, 2011). With the exception of a respondent's profile, all variables were measured on a five-point Likert Scale. The point '1' on the scale indicated 'strongly disagree', while '5' represented 'strongly agree' in response to the statements.

4.5.3 Item Development

Items appearing in the questionnaire were adapted from previous studies cited by other researchers who have investigated similar issues. Some modifications were made to contextualise the items in relation to supply chain relationships in Malaysian electrical and electronics industries. This involved replacing the word "partnership" with "relationship". All items were tested and assessed for their content validity and relevance by four experts, who became the respondents in the pre-test study (see section 4.7.2). This is to ensure a full domain of construct is captured for both the formative and reflective constructs.

4.6 Population, Sampling and Respondents

The following sub-sections will discuss the target population, sampling procedures and intended respondents of this study.

4.6.1 Population Definition

Sampling is the most important procedure of a research activity, as it determines the population to be targeted. The population chosen for this study are those organisations that meet the following criteria:

i. Registered as a manufacturing firm by the Federation of Malaysian Manufacturers (FMM);

ii. For the SMEs, the definition as a small or medium-sized enterprise is according to the definition approved by the National SMEs Development Council (NSDC), Malaysia (see Table 2.2 in section 2.6.1)

Meanwhile, another population chosen for this study are those MNCs located at any six identified MSC Zones for the electrical and electronics industries in Malaysia. These industries were selected to represent the manufacturing industry in the current study, due to their contributions to the Malaysian development and economic growth (NSDC, 2010).

4.6.2 Sampling Design

This section further clarifies the determination of the sampling frame, sampling method and sample size used in the study.

A. Sampling Frame

Sampling frames can be defined as "a (physical) representative of all the elements in the population from which the sample is drawn" (Sekaran & Bougie, 2010, p. 267); for example, a company database, random-digit dialling or a membership roster (Hair et al., 2009). The sampling frame for this study was the Federation of Malaysian Manufacturers (FMM) directory published in 2010. The directory was chosen as it updates its information in every publication year, and provides the most accurate data about manufacturing companies in Malaysia. The 2010 publication version included a list of 2,225 manufacturing firms of varying sizes, including micro, small, medium and large organisations. In addition, the directory provides detailed information on the manufacturing organisations in Malaysia, inclusive of name, company specialization, postal address, website, contact persons with the respective email addresses and number of employees. The SMEs were chosen for the sample on the basis of number of employees; 1,402 companies were considered to be SMEs.

B. Sampling Methods and Sample Size

Identifying and categorizing SMEs from the FMM directory required a great deal of time. The researcher required to identify and select appropriate firms through manual searching from the overall listed firms. One-by-one selection was done based on the number of full time employees as described by National Development Council (NSDC).

The selected SMEs have employees between 5 and 150 while MNCs have more than 150 employees.

This study employed the unrestricted probability sampling design, known as simple random sampling method to determine the sample to be studied (Sekaran & Bougie, 2010). Simple random sampling was chosen because it reduces bias by giving equal and independent chance to every member of the population (Kumar, 2005; Lohr, 2009). This method offers the most generalisability for the findings (Sekaran & Bougie, 2010). For this study, 300 SMEs and 300 MNCs were selected to receive the questionnaires.

SEM is based on covariance, and covariance and correlations are unstable when evaluated from small sample size (Tabachnick & Fidell, 2007). There are no clear cut rules or definitive recommendations when it comes to the required sample size to obtain reliable solutions and parameter estimates in SEM. However, while utilising large sample sizes with latent variables to estimate in structural equation models will lead to a degree of confidence about such statistics, the asymptotic statistical theory underlying parameter estimations provides clues as to how large the sample size should be (Holmes-Smith, 2000). The minimum requirements for SEM are presented in Table 4-4.

Table 4-4: Sample Size for Structural Equation Modelling

Statistical Analysis	Minimum Sample Size
Structural Equation Modelling (SEM)	• Sample size as small as 50 found to provide valid results • Recommended minimum sample sizes of 100 – 150 to ensure the stable Maximum Likelihood Estimation (MLE) solution • Suggested sample sizes in a range of 150 - 400

Source: Hair et al., (2003)

Since this study will employ SEM as the main analytical method, it is important to take into account that the Maximum Likelihood Estimation (MLE) method in SEM requires a sufficient sample size. To obtain reliable results, it has been recommended that the sample should include at least 100 observations, and that the sample size should at least be 5 to 20 times the number of parameters being estimated (Hair et al., 1998). McQuitty (2004) suggested that it is important to determine the minimum sample size required in order to achieve a desired level of statistical power with a given model prior to data collection. Schreiber et al. (2006) mentioned that although sample size needed is affected by the normality of the data and estimation method that researchers use, the generally accepted value is 10 participants for every free parameter estimated.

Although there is little consensus on the recommended sample size for SEM, Yuksel et al. (2010), Hoe (2008), Sivo et al,(2006), and Garver and Mentzer (1999) proposed a 'critical sample size' of 200. In other words, as a rule of thumb, any number above 200 is understood to provide sufficient statistical power for data analysis. However Bentler and Chow (1987) suggested under normal distribution theory the ratio of sample size to the number of free parameters should be at least 5:1 to get reliable parameter estimates. Sample size can affect chi-square statistic and measures of goodness-of-fit (Bearden et al., 1982; Yadama & Pandey, 1995). Small sample sizes create problems for maximum likelihood-based estimation procedures like AMOS, and consequently unstable results may occur (Fornell & Larcker, 1981; Gerbing & Anderson, 1988).

4.6.3 Unit of Analysis

The respondent is "the person who answers an interview's questions or provides answers to written questions in a self-administered survey"(Zikmund, 2003, p. 175). This study focuses on analysis at the organisational level, implemented through the involvement of production, supply chain, operations, and procurement managers of electrical and electronics MNCs and SMEs in Malaysia. Managers of operations, procurement, production and supply chain management were pre-identified to be the target population for this research. They play a significant role in the decision-making process in their organisation. This approach is intended to validate the applicability of the conceptual model in a working situation.

The rationale for taking this approach relates to the fact that the supply chain relationship model as the main component of the research model was developed for a workplace context where substantial knowledge is applicable on the research topic. The study explored the antecedents of supply chain relationship in agile environment in the context of the electrical and electronics industry in Malaysia. This requires respondents with experience in supply chain management, particularly production, supply chain, operations and procurement and have significant role in the decision making process in the organization.

4.7 Process of Survey Development

The large-scale survey through survey questionnaire was developed based on the processes suggested by Cho et al., (2008) and Sekaran and Bougie (2010). Figure 4-3 shows the three major steps involved before conducting the main survey or the large-scale survey in the final step of this study.

Step 1: Literature	**Step 2: Pre-test**	**Step 3: Pilot Study**	**Step 4: Large-Scale Survey**
The analysis of the literature leads to the development of scale measurements for the empirical setting	The objective is to strengthen the content validity of the measurement items. Four industrial experts involved in this pre-test	Two pilot studies were conducted. The objective is to further appraise and purify the instruments and examine the internal consistency of the items. Also, to make initial assessment of the important constructs of supply chain relationships	After questionnaires have been modified and translated into Malay language, finally the final survey is undertaken.

Figure 4-3: Process of Survey Instrument Development

The next sub-sections comprehensively discuss each step of the study. Section 4.7.1 discusses the literature analysis (Step 1); Section 4.7.2 discusses the pre-test (Step 2); Section 4.7.3 discusses the pilot studies (Step 3). The key and final process, the data collection using large-scale survey (Step 4) is discussed in Section 4.7.4.

4.7.1 Literature Analysis

The questionnaire-development process began with extensive analysis of the related literature. Most of the scales used in this study have been adapted from previous studies (see Section 4.7.2). However, most of the previous studies were based on different contexts; this was particularly so for the limited studies relating to Malaysian electrical and electronics industries, looking from the dyadic perspectives of buyers (MNCs) and suppliers (SMEs). The analysis, modification and revision of instruments gathered from existing studies to fit the business environment of the Malaysian industry required significant time. The selection of an accurate statistical technique to choose the appropriate and suitable scales also required time; after thorough analysis of the literature, the researcher chose the five-point Likert Scale.

4.7.2 Pre-test

A pre-test was conducted prior to the pilot study, to strengthen the content validity of the instruments by examining the degree of relevance of each variable item, and obtaining feedback from industrial experts confirming their acceptance of the proposed items and questions from the practical perspectives. In another words, the purpose of the pre-test was to examine the content validity, and assess the appropriateness of the original instruments. Items which are not important in actual context should be eliminated.

The five-point Likert Scale was employed to measure the degree of variable item relevance at this stage. The pre-test was done with four industrial experts, two from MNCs and SMEs respectively, as listed in Table 4-5 (below). Experts in the area of supply chain management were targeted - specifically production, supply chain, operations and procurement - as they were believed to have the experience and information on the organisation's supplier selection. The organisations chosen for this pre-test were located in the Selangor, the central region of Peninsular Malaysia. These experts comprised of executive director, head of unit, general manager and managers of the production, supply chain, operations and procurement of the MNCs and SMEs. They were chosen for their experience, competence, and significant role in the organisation's decision-making process. The organisations chosen have been in the industry for many years, and they are the major players in the Malaysian Electrical and Electronics Industry. Both MNCs involved in this study have been operating for more than 10 years, while SMEs have been in operation between five to seven years.

Table 4-5: List of Companies for Pre-Test

Name of Organization	Type of Organization	Operating Years
CSL Manufacturing	MNC (Shah Alam Industrial Park)	>10
Ericson	MNC (Shah Alam Industrial Park)	>15
I-Gate Digital Sdn Bhd	SME (Technology Park Malaysia)	7
Ad-Deen Technology Sdn Bhd	SME (Shah Alam Industrial Park)	5

Based on the feedback provided by the respondents on each questionnaire item, the variables were modified to suit the context area of research. Feedback and suggestions offered by the experts were further discussed with the research senior supervisor. The findings resulted in clarification of instructions, elimination and rewording of some items which believed would lead to further confusion and redundancy. Items which are difficult to measure in the actual context of supplier selection were recommended to be deleted from the questionnaires. The experts opinions were used to strengthen the questionnaire items for each construct as explained in the following sections.

A. Partner's Characteristics Capability (PCC) Measures

PCC is measured by items of partner compatibility (PO) and resources complementarities (RC). Expert A suggested a more detailed explanation of the partner's characteristics capability be given to respondents prior to completing the questionnaire. The expert's suggestion was addressed by providing a brief overview of partner's characteristics capability in the introduction, to ensure the respondents understood what it means. Seven items of PO (PO1-PO7) were originally adapted from the items developed by a combination of different authors as summarized in Table 4-6.

The items were assessed in the pre-test study for their relevance to the research context, and also whether they had valid content for the industry practices being measured. Based on the feedback, four experts suggested replacing PO4 with 'compatible systems and tools' which is the term being commonly used instead of 'operating procedures'. PO4 was revised to 'our organization's systems and tools are compatible to our partner'. Items PO6 and PO7 were suggested to be eliminated due to redundancy and irrelevancy.

Table 4-6: Initial Measurement Items for Partner Compatibility

Construct	Measurement Item	Authors
PO1	Our organization's values and norms are similar to our partner	Brouthers et al., (1995), Sarkar et at., (2001), Wong et al., (2005), Wu et al., (2009) Cheung et al., (2010)
PO2	Our organization's goals and objectives are compatible to our partner.	
PO3	Our organization and our partner have common views on most business matters.	
PO4	The operating procedures of our organization are compatible to our partner.	
PO5	Our organization and our partner have compatible organizational cultures.	
PO6	Our organization and our partner have compatible management styles.	
PO7	Our organization and our partner have participated in many alliances	

Meanwhile RC is measured by items RC1 to RC7 adapted from various authors as listed in Table 4-7 below. The pre-test results identified that all the four experts agreed with all the RC items in the questionnaire. These items have been used as measurement items for resources complementarities by many studies and experts believed they represented the factor substantially. For this reason, the experts' opinions were acknowledged and all the items remained unchanged for the final questionnaire.

Table 4-7: Initial Measurement Items for Resource Complementarities

Construct	Measurement Item	Authors
RC1	Our partner's knowledge of customers complemented our organization's resources and capabilities	Jiang et al., (2008), Wu et al., (2009) Cheung et al.,(2010)
RC2	Our partner's channels of distribution compensated our organization's resources and capabilities.	
RC3	Our partner's links with major buyers complemented to a significant extent our organization's resources and capabilities	
RC4	Our partner's knowledge of technology management compensated our organization's resources and capabilities	
RC5	Our partner's industry knowledge compensated our organization's resources and capabilities	
RC6	Our partner's experience in related technologies compensated our organization's resources and capabilities	
RC7	Our partner's systems and tools availability compensated our organization's resources and capabilities	

B. Alliance Management Capability (AMC) Measures

AMC is measured using two scales; cooperation (CO) and conflict management (CM). Five items of CO (CO1- CO5) were adapted from various authors as displayed in Table 4-8. Two experts agreed on the generalisation in the meaning of item CO5, 'adjustments to our on-going relationship'. Adjustments can be understood by making changes to the management policy and procedure. The experts' view was addressed by rephrasing CO5 with 'our organisation makes strategic decisions in consultation with our alliance partner' as this is a more appropriate dimension to measure cooperation.

Table 4-8: Initial Measurement Items for Cooperation

Construct	Measurement Item	Authors
CO1	Our organization willingly provides accurate strategic information to our partner	(Doz, 1996) Parise & Casher (2003) Sweeney & Webb (2007).
CO2	Our organization provides technical information to our partner if needed	
CO3	Our organization shares operational information with our partner	
CO4	Our organization always look for new ways to do business with our partner	
CO5	Our organization makes adjustments to our on-going relationship to cope with changing business circumstances	

On the other hand, five items of CM (CM1-CM5) listed in Table 4-9 were also adapted from various authors as shown in the table below. All the items remained unchanged since they were claimed relevant to be considered by industry for supply chain relationship model.

Table 4-9: Initial Measurement Items for Conflict Management

Construct	Measurement Item	Authors
CM1	Our organization and our partner have developed explicit mechanism to resolve conflict(s)	Das & Teng (2001), Chen & Paulraj (2004), Chopra & Sodhi (2004), Narasimhan & Talluri (2009).
CM2	Our organization and our partner resolve conflict (s) through close interaction with each other	
CM3	Our organization and our partner undertake joint problem solving to avoid conflict(s)	
CM4	Our organization encourages employees to be culturally sensitive while resolving conflicts	
CM5	Our organization involves top management to resolve conflicts if needed	

C. *Process Capability (PC) Measures*

PC is measured by six items of information technology (IT1-IT6), five items of innovation (IN1-IN5) and four items of flexibility proficiency (FP1-FP4). All information technology items were originally adapted from the items developed by a combination of different authors as summarised in Table 4-10 below.

Each of the four experts commented on the similarity of item IT1 and IT2. IT2 is found to be more appropriate in measuring IT capability of the organisation requiring IT1 to be omitted from the final questionnaire. The comments made by the experts addressed the importance of clarifying the respondents with physical information technology capabilities rather than limit it to electronic links to cope with changing business circumstances.

Table 4-10: Initial Measurement Items for Information Technology

<table>
<tr><th>Construct</th><th>Measurement Item</th><th>Authors</th></tr>
<tr><td>IT1</td><td>Inter-organizational coordination between our organization and partner is achieved using electronic links</td><td rowspan="6">Sanders & Primus (2002),
Yusuf et al.(2004),
Chen & Paulraj (2004),
Swafford (2008),
Paulraj et al.(2008)</td></tr>
<tr><td>IT2</td><td>Our organization uses information technology enabled transaction processing to coordinate supply chain activities</td></tr>
<tr><td>IT3</td><td>Our organization has capable employees to use information technology enabled transaction processing</td></tr>
<tr><td>IT4</td><td>Our organization shares sensitive information with our partner</td></tr>
<tr><td>IT5</td><td>Exchange of information between our organization and our partner takes place frequently, informally and/or in a timely manner</td></tr>
<tr><td>IT6</td><td>Our organization and our partner keep each other informed about changes that may affect us</td></tr>
</table>

The five items presented in Table 4-11 were developed to measure innovation capability (IN). All items were adapted from various authors and revised to match the innovative context of the organization. IN items highlighted the need to explain the definition of innovation capability to the respondents. Based on the feedback, all IN items were retained and used in the survey.

Table 4-11: Initial Measurement Items for Innovation

Construct	Measurement Item	Authors
IN1	Our organization involves our partner in the product design and development stage	Guan & Ma (2003), Chen & Paulraj (2004), Narasimhan et al. (2006), Paulraj & Chen (2007)
IN2	Our partner has major influence on the design of new products	
IN3	Our organization emphasizes on constant innovation as part of our corporate culture	
IN4	Our organization has the capacity to jointly develop new product and processing technologies to satisfy future needs	
IN5	It is our organization's policy to constantly develop innovative capability in order to compete in the global market.	

The third factor reflected process capability in this study is flexibility proficiency. Flexibility Proficiency (FP) is measured using adapted items from several authors with revision to suit the objective of this research. The four items for FP is shown in Table 4-12 below. Experts confirmed the items were relevant and kept unchanged for the final questionnaire.

Table 4-12: Initial Measurement Items for Flexibility Proficiency

Construct	Measurement Item	Authors
FP1	Our partner is capable of responding to our changing needs and requirement	Agarwal et al., (2006), Narasinham et al., (2006), Swafford et al., (2008)
FP2	Our organization is able to adjust production volume to meet unexpected demand	
FP3	Our organization and partner are able to produce a range of products for different types of customers	
FP4	Our organization and partner increase the number of new products introduced each year to cope with new market competition	

D. Supply Chain Agility Practices (SCAP) Measures

Supply chain agility performance (SCAP) is the dependent variable in this study. It is operationalised using four items adapted from few authors as shown in Table 4-13. All the items were validated and accepted for their relevancy to this study.

Table 4-13: Initial Measurement Items for Supply Chain Agility Practices

Construct	Measurement Item	Authors
SCAP1	The partnership enables our organization's capacity to increase frequencies of new product introductions	Mapes et al., (1997) Sharifi & Zhang (1999) Swafford et al.,(2008) Cheung et al.,(2010)
SCAP2	The partnership enables our organization's ability to increase levels of product customization	
SCAP3	The partnership enables our organization's manufacturing technologies to reduce our manufacturing lead time	
SCAP4	The partnership enables our organization to act promptly on changes in customers requirement	

E. Supply Chain Operational Performance (SCOP) Measures

Four adapted items presented in Table 4-14 were used to measure supply chain operational performance (SCOP) in this study. All the experts in the pre-test expressed their opinion on the relevancy and importance of the items. All the items were retained and kept unchanged for the final questionnaire.

Table 4-14: Initial Measurement Items for Supply Chain Operational Performance

Construct	Measurement Item	Authors
SCOP1	The alliance has improved our organisation delivery performance	Cheung et al., (2010) Nyaga et al., (2010)
SCOP2	The alliance has improved our order cycle time	
SCOP3	The alliance has increased our forecast accuracy	
SCOP4	The alliance has improved our order processing accuracy	

F. Supply Chain Financial Performance (SCFP) Measures

Table 4-15 presents three items of supply chain financial performance (SCFP). All items were validated for their suitability for this study. All items were accepted for the final questionnaire without any changes.

Table 4-15: Initial Measurement for Supply Chain Financial Performance

Construct	Measurement Item	Author
SCFP1	Our organisation is satisfied with the alliance in terms of profitability	Nyaga et al., (2010)
SCFP2	Our organisation is satisfied with the alliance in terms of market share	
SCFP3	Our organisation is satisfied with the alliance in terms of sales growth	

In summary, the pre-test results confirmed agreement among the experts that the content validity of the items variables was relevant and appropriate to the economic and cultural context applied. Questionnaires were modified and revised prior to the pilot study.

4.7.3 Pilot Study

Two pilot studies were conducted for two different purposes. The first pilot study using self-administered questionnaires was to further appraise and purify the instruments and examine the internal consistency of the items. The second pilot study using Analytical Hierarchy Process (AHP) was undertaken to make initial assessment of the important constructs of supply chain relationships in an agile environment. The results of the pilot study are discussed in the following sections:

A. Self-Administered Questionnaire

The pilot study using self-administered questionnaires was aimed to further appraise and purify instruments and examine the internal consistency of the measured items. For this reason, a panel of industry experts reviewed the original English version of the questionnaire before the pilot study. Responding to the reviewer’s comments, the questionnaire was revised and modified. For the purpose of the pilot study, 35 questionnaires consisted of thirty-six continuous items and eighteen descriptive items were distributed to the Klang Valley Region of Malaysia. Klang Valley was selected based on time and location, for the researcher’s convenience. Questionnaires were also emailed to 10 potential respondents in the Northern Region of Malaysia where many electrical and electronics manufacturers are located. Twenty questionnaires were collected personally from the identified respondents who are willing to participate in this survey.

Cronbach's Alpha was used as a measure of reliability and construct validity to examine the internal consistency of items measured. Analysis of the pilot study data showed coefficient alpha values of PCC=0.897, AMC=0.862, PC=0.875, SCAP =0.750, SCOP=0.843 and SCFP=0.838, confirming an acceptable internal consistency reliability and evidence of content and construct validity for all the measurement items of the six constructs. Exceeding a minimum α value of 0.70 for variables indicates that the variables are internally consistent and are good measures of the concept under study (Nunnaly, 1978; Hair et al., 2010). Prior to the actual survey, a second round of discussion with the senior supervisor was done. The discussion focused on shortening and further clarification of the questionnaire. With the aim to improve readability and reduce amount of time to answer the survey questionnaire, minor changes were made to the layout of the questionnaire.

B. Analytical Hierarchy Process (AHP)

Supply chain relationship is a multi-criteria decision making problem which includes identifying important factors. In order to recognise important factors of supply chain relationship, it is necessary to consider both qualitative and quantitative factors simultaneously. AHP is a suitable approach for undertaking quantitative as well as qualitative analysis (Saaty, 1994). It is a multi-criteria decision making analysis that assists the decision-maker facing a complex problem with multiple conflicting and subjective criteria in diverse decision-making situations. Perhaps the most creative task in making a decision is to choose the factors that are relevant for that decision.

Thus, prior to the main study, researcher extended the pilot study by using AHP to grasp the initial thoughts from a panel of experts on important factors for establishing a supply chain relationship model. Meanwhile, the initial pilot study conducted was restricted only to assessing the internal consistency and construct validity of the questionnaire. The main objective was to determine the weighting of subjective judgments for the scientific evaluation framework of supply chain relationship model. In other words, it is to identify and rank supply chain relationship factors that are being considered relevant in developing the supply chain relationships model. By using AHP, factors assembled from broad literature reviews (discussed in Chapter 3) were arranged, once selected, in a hierarchic structure descending from an overall goal to criteria, sub-criteria and alternatives in successive level (Saaty, 1990).

The four steps involve in the modelling of AHP are:

1. Structuring the problem as a hierarchy, thus building the AHP model (see Figure 4.4);
2. Collection and compilation of decision makers' opinions and application of priority procedures. The scale of absolute values of 1-9 is used for making the pair-wise comparison judgments (refer Table 4.16);
3. Identifying factors of supply chain relationship through synthesis of normalised priority weights;
4. Checking inconsistency of opinions of decision makers.

Figure 4-4 illustrates the structure of AHP model of supply chain relationship as discussed in Chapter 3. It involves three hierarchy levels. Level 1 is the overall model of supply chain relationships (SCR). It is measured using three identified indicators (Level 2) from extensive literature search (partner's characteristics capability, alliance management capability and process capability). Level 3 comprises of indicators of Level 2 in the model. Four identified indicators of partner's characteristics capability (partner compatibility, goal congruence, corporate reputation and resources complementarities), four indicators of alliance management capability (commitment, trust, cooperation and conflict management) and three indicators of process capability (information technology, innovation and flexibility proficiency).

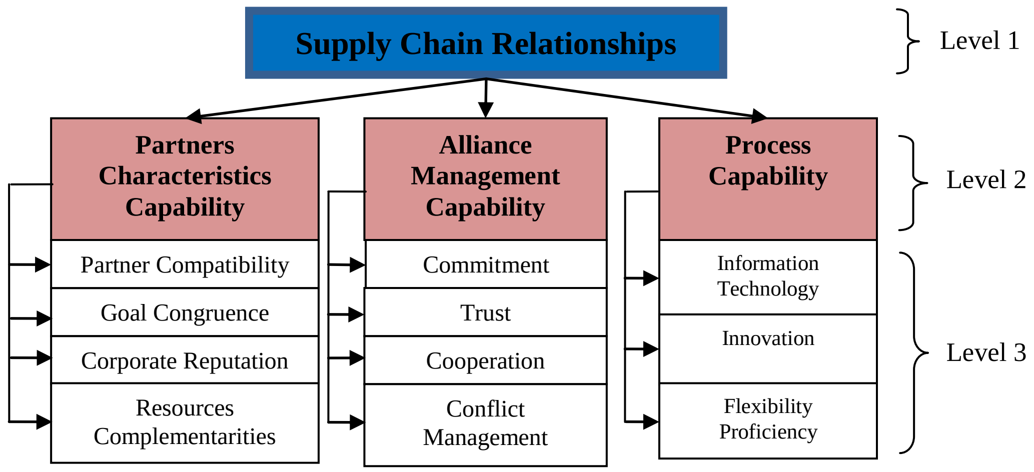


Figure 4-4: Structure of AHP Model of Supply Chain Relationship

Twenty interviews were conducted with the industrial experts comprising of senior managers in both selected small and medium enterprises (SMEs) and Multinational Companies (MNCs). The companies were located in Selangor, the central region of Malaysia, and contributed to the growth of the Malaysian electrical and electronics industry in the past. The senior managers selected were from the procurement, operations, logistics and supply chain management departments and play significant roles in decision-making process. The names of these managers were supplied through researcher's networking. The researcher personally contacted the respondents who specified their willingness to participate in the survey.

The interview questions (refer Appendix 1) were emailed to the respondents prior to the interview day, as to secure their understanding on the research objectives. Times of interview for all respondents were arranged according to the respondent's availability and were conducted at the respondent's workplace. Respondents were briefed on the procedure and what is required in AHP. To capture the respondents' understanding on the interview questions, the researcher went through every question with the respondent and the verbal description of judgments for every scale was clearly explained to the respondents. Respondents were required to identify the relevancy of the factors based on their importance in establishing the supply chain relationship model. Table 4-16 exhibits the verbal description of each rating value. Further clarification was given when researcher asked for a detailed explanation.

Table 4-16: Scale with Verbal Description of Judgment

Numerical Value	Judgment	Verbal description of judgment
1	Equally important	Two alternatives shares the same level of importance
3	Moderately more important	Experience and judgment slightly favors one alternative
5	Strongly more important	Experience and judgment strongly favors one attribute over another
7	Very strongly more important	Experience and judgment tell that one alternative is much more important than the other
9	Extremely more important	The difference of importance is extreme
2,4,6,8	Intermediate values between the two adjacent judgments	Used if more precision is needed

Source: Saaty (1994)

From a total of twenty interviews conducted, from both SMEs and MNCs, the list of acceptable responses was trimmed to twelve respondents (six from SMEs and MNCs respectively). The selection was based on a Consistency Index (CI) of 0.10. CI calculation is used to measure how consistent the judgments have been relative to large samples of purely random judgements. If the CI is much in excess of 0.1, the judgements are untrustworthy because they are too close for comfort to randomness and the exercise is valueless or must be repeated (Coyle, 2004).

Description of respondents is important, as AHP requires respondents who are highly knowledgeable and experienced in this researched area. Table 4-17 depicts the description of respondents for AHP analysis. The respondent's position, education level and managerial experience vary from one respondent to another. The number of employees and years in which the organisation has been in operation also differ from one respondent to another. Summarizing the respondent's position, one out of twelve (8.3%) is the Director of the organisation, two (16.7%) respondents are the Senior Manager, and majority which is nine (75%) are the Head of Department. All the six MNCs respondents hold a post graduate qualification, while five out of six (83.3%) SMEs respondents have a Bachelor Degree and only one (16.7%) holds a Diploma qualification. The majority of the respondents (91.7%) have more than 5 years of managerial experience.

From the perspective of the organisation's operation years, a majority of the organisations (75%) have been operating for more than 10 years. This number indicates their long-term establishment in the industry. The number of employees identifies the size of the organisation as small, medium or large. All the MNCs respondents have more than 500 employees. The small enterprise has less than 50 employees, while medium enterprise has between 51 to 150 employees.

Table 4-17: Description of Respondents (AHP Analysis)

Respondent's Related				Organization Related	
Respondent	**Respondent's Position**	**Education Level**	**Managerial Experience**	**No of Employee***	**Operation Years**
SME1	Senior Manager	Graduate	8 years	51-150	8
SME2	Head of Department	Graduate	13	51-150	13
SME3	Senior Manager	Graduate	0	51-150	13
SME4	Head of Department	Graduate	13years	51-150	> 30 years
SME5	Head of Department	Diploma	8years	20-50	4
SME6	Head of Department	Graduate	8years	20-50	3
MNC1	Director	Postgraduate	>16years	501-1000	> 30 years
MNC2	Head of Department	Postgraduate	8years	501-1000	8
MNC3	Head of Department	Postgraduate	8years	501-1000	> 30 years
MNC4	Head of Department	Postgraduate	13years	501-1000	> 30 years
MNC5	Head of Department	Postgraduate	13years	501-1000	> 30 years
MNC6	Head of Department	Postgraduate	8years	501-1000	26

The analysis was done separately for SMEs and MNCs, one after another, before comparison was made. Table 4-18 presents the comparative results generated for factors with respect to supply chain relationships between SMEs and MNCs. It presents the ranking of factors for supply chain relationships with the overall SMEs Consistency Index (CI) ranging from 0 to 0.08 while MNCs reported CI between 0 and 0.09. Analysing the SMEs responses, five out of six (83.3%) respondents rank Partner's Characteristics Capability as the most important factor for buyer and supplier relationships, while SME4 considers Process Capability as the most important factor with a weighted score of 0.487.

From the description of respondents, SME4 has been operating for more than 30 years and this may be the reason why SME4 regards Process Capability as the most important factor. As for the factor ranked second important, four out of six (66.7%) SMEs respondents indicated Process Capability as the second-most important factor to be considered. SME4 considers Partner's Characteristic Capability instead, with a weighted score 0.435. Alliance management capability has been ranked the third or least relevant factor in supply chain relationship model by five out of six (83.3%) SMEs respondents. SME5 however, considers all factors were equally relevant in the supply chain relationship. SME5 was a small enterprise which has been operating for only 4 years. As a new operating company with lower education and experience level, all factors may be perceived to be important in building a supply chain relationship.

Describing the MNCs respondents however, indicates a different result. Four out of six MNCs (66.6%) respondents ranked process capability as the most relevant factor, while MNC2 and MNC6 have the same opinion that a partner's characteristics capability is most relevant factor. These two MNCs respondents have been in operation for less than 30 years. Partner's characteristics capability, is ranked as second-most relevant factor by four MNCs respondents, while MNC2 considers alliance management capability. For the least relevant factor, majority (66.7%) of the MNCs respondents ranked alliance management capability, while MNC2 regards process capability as least relevant in a supply chain relationship. MNC6 which has been in operation for 26 years believes all factors are equally important in building a buyer and supplier relationship. Reviewing the description of respondents, the duration of operation may contribute to the different opinion on factors of the supply chain relationship in agile environment. This may conclude that those organisations which have been operating for more than 30 years may emphasise on the relevancy of process capability for an established supply chain relationship model.

Table 4-18: Ranking of Supply Chain Relationship Constructs

	SME		MNC	
Ranking	**Construct**	**Weight**	**Construct**	**Weight**
1	Partner's Characteristics Capability	0.674 0.627 0.627 0.455 0.333	Process Capability	0.747 0.731 0.717 0.635
	Process Capability	0.487	Partner's Characteristics Capability	0.674 0.333
2	Process Capability	0.455 0.280 0.279 0.226	Partner's Characteristics Capability	0.287 0.195 0.188 0.134
	Partner's Characteristics Capability	0.435	Alliance Management Capability	0.333 0.134
	Alliance Management Capability	0.333		
3	Alliance Management Capability	0.101 0.094 0.093 0.091 0.078	Alliance Management Capability	0.119 0.088 0.081 0.078
	Process Capability	0.333	Process Capability	0.333 0.101

The summary of five most relevant sub factors for 2nd level of AHP model with respect to the factors identified for buyer and supplier relationship is shown in Table 4-19. The overall Consistency Index for SMEs is between 0.03 and 0.8 and MNCs ranging from 0.05 to 0.11. Judging from the results, it shows clearly that resource complementarities were the most relevant factor considered by three out of six (50%) SMEs respondents, with weighted scores of 0.378, 0.389 and 0.15. The other three SMEs respondents considered partner compatibility, information technology and flexibility proficiency instead, with weighted score of 0.274, 0.209 and 0.221 respectively. It was noted from the above findings that resource complementarities and partner compatibility were the sub-factors of partner's characteristics capability. This reveals that SMEs focused more on sub-factors of partner's characteristics capability.

MNCs respondents however, have different opinion about the most relevant factor for supply chain relationship. Four out of six (66.7%) MNCs respondents claimed flexibility proficiency as the most relevant factor with weighted score of 0.528, 0.436, 0.445 and 0.524. Flexibility proficiency was one of the factors for process capability. However, MNC2 and MNC6 considered partner compatibility and resources complementarities as the relevant factors with the weight scores of 0.298 and 0.219 respectively.

Assessing the operation years of the organisation, these two MNCs respondents have been in operations for less than 30 years and this may reflect their different opinions. Comparing the scores of the analysis, SMEs respondents considered factors of partner's characteristics capability such as resources complementarities, partner compatibility and goal congruence. Meanwhile MNCs considers factors of process capability such as flexibility proficiency, information technology and innovation. Overall, five out of the twelve (41.7%) respondents claimed flexibility proficiency as the most important factor of buyer and supplier relationship. These respondents' organisations have been in operation for more than 30 years. Resources complementarities were considered as the most important factor by four respondents (33.3%). SME4 considered information technology and flexibility proficiency as equally important. It was noted that flexibility proficiency and information technology were the sub-factors of process capability. These were followed by the sub-factors of partner's characteristics capability which were resources complementarities and partner compatibility.

Drawing on the AHP analysis, this pilot study addresses the relevant factors of supply chain relationships in agile environment between MNCs and SMEs in the context of Malaysian electrical and electronics industry. The results provide a useful input for the researcher to revise the questionnaire items for the main survey. The information gathered from the senior managers of both MNCs and SMEs discovered that to become suppliers to the MNCs, SMEs need to focus on developing its sub-factors of process capability such as flexibility proficiency and information technology which MNCs claimed as the two most relevant factors in building a good relationship.

The results evidenced that SMEs were focusing on the sub-factors of partner's characteristics capability such as partner compatibility and resource complementarities. To establish a good relationship with local SMEs in the Malaysian electrical and electronics industry, MNCs then need to heighten their partner's characteristics capability particularly partner compatibility and resource complementarities.

Table 4-19: Ranking of Sub-Factors with Respect to Supply Chain Relationship

	SME		MNC	
Ranking	**Factor**	**Weight**	**Factor**	**Weight**
1	Resources Complementarities	0.389 0.378 0.150	Flexibility Proficiency	0.528 0.524 0.445 0.436
	Partner Compatibility	0.274	Partner Compatibility	0.298
	Flexibility Proficiency	0.221	Resources Complementarities	0.219
	Information Technology	0.209		
2	Partner Compatibility	0.198 0.135	Information Technology	0.210 0.150 0.128
	Flexibility Proficiency	0.156 0.209	Resources Complementarities	0.265
	Resources Complementarities	0.274	Innovation	0.135
	Innovation	0.198	Conflict Management	0.213
3	Flexibility Proficiency	0.146 0.136	Resources Complementarities	0.116 0.082 0.079
	Partner Compatibility	0.153 0.159	Trust	0.095
	Resources Complementarities	0.192	Innovation	0.101
	Trust	0.129	Flexibility Proficiency	0.212

In summary, process capability and partner's characteristics capability were confirmed as the most relevant factors in building supply chain relationships model while resources complementarities, partner compatibility, flexible proficiency and information technology were the most important sub-factors of supply chain relationship. AHP results were consistent with the experts' opinion gathered in the pre-test, thus resilient reason to exclude those less important and irrelevant sub-constructs such as goal congruence, corporate reputation, trust and commitment from the final questionnaire.

4.7.4 Large- Scale Survey

According to Sekaran and Bougie (2010), data collection is an important component to completing the research design. To accomplish the process of data collection, the fourth and final step of the overall survey development was carried out between November 2010 and April 2011. All possible data collection methods were identified prior to obtaining an adequate response rate using questionnaires and applicable and effective methods for Malaysian context. A low response rate is a common problem faced by researchers when collecting data in Malaysia. Manufacturers in Malaysia are not easily convinced, and individuals are not easily persuaded to participate in surveys. Most believe that surveys are designed by organisations for commercial purpose, and require them to disclose their confidential information.

This study used a quantitative method through the drop-and-collect survey method as the means of data collection, for reasons addressed in section 4.4.1. Drop-and-collect method is deemed to be the most effective method, particularly in terms of avoiding a low response rate, the complexity of the topic and participants concerns around anonymity. With the drop-and-collect method, the questionnaires were given to the identified respondents located in MSC zones as discussed in section 2.1, where most of the electrical and electronics manufacturers are located. The objectives of the survey were explained to participants as for purely academic purposes. The analysis of this large–scale survey is presented in Chapter 6.

4.8 Ethical Considerations

This study followed the Ethics Guideline Procedures outlined by RMIT University in the Ethics Review Process. The objectives were to ensure that questions were designed according to the standard requirements of the ethics committee, and simultaneously to confirm that no belittling questions were asked. The researcher was prepared, organised, and considerate of participants' confidentiality in this study. The confidentiality of the information provided by respondents based on the questionnaire items was assured through ethics approval procedures. Ethics approval was obtained by the RMIT Human Research Ethics Committee (HREC) prior to commencement of the research stage involving respondents.

First, the respondents of the pre-test were approached through electronic mail (e-mail), followed by a telephone conversation. A letter of invitation was also sent by e-mail. A meeting date was agreed before the interview, to confirm their willingness to participate in this study. Second, the respondents of the pilot study and drop-and-collect questionnaires were approached through a cover letter which was attached to the questionnaire, to initially identify the researcher. In the cover letter, the respondents were advised that the participation consent in this study was given once they answered and the questionnaire was collected from them. This was clarified in the cover letter with the sentence, “the return of this questionnaire will imply your consent to participate in this survey”. For both stages, the options to participate were explained to respondents. Moreover, they were informed that their privacy and confidentiality will be strictly maintained in such a manner that they will not be identified in the thesis report or any related publication.

4.9 Summary

This chapter has presented the research methodologies used in this research, detailing every techniques used. The discussion covers several issues including research paradigms and justification of research design, the selection of respondents, processes to accomplish data collection and ethical considerations.

The justification for the methodology was elaborated based on Sekaran and Bougie (2010). As explained, hypothesis testing is a primary focus in this study. Also, it leads to the development of a non-causal relationship. The methodology used in this study is pertinent to the idea of minimal interference, as it involves responses from top-level managers. The major part of this chapter described the process of survey development, which involved four steps: literature review, pre-test, pilot studies and a large-scale survey using drop-and-collect method. Finally, this chapter discussed the ethical considerations for this study, which were approved by HREC, RMIT University. The next chapter will discuss the primary research methodology which focuses on the analytical procedure and the techniques that will be applied in the data analysis.

CHAPTER FIVE

PRIMARY RESEARCH METHODOLOGY: ANALYTICAL PROCEDURE

5.1 Introduction

Chapter 4 detailed the primary research methodology on survey design and implementation. This chapter continues from Chapter 4, and explains the primary research methodology, the focus is on the analytical procedures used to fulfil the statistical requirements during the process of data analysis, using confirmatory factor analysis (CFA) and structural equation modelling (SEM). The actual results of the data analysis will be discussed in Chapter 6.

This chapter is organised with the introduction in Section 5.1, Section 5.2 gives an overview on exploration of preliminary data of this study. Section 5.3 discusses structural equation modelling as the methodology employed in this study. Issues and related methods of structural equation modelling analysis are discussed in the sub-sections, before the concluding remarks in section 5.4.

5.2 Exploration of Preliminary Data

An exploratory data analysis was first conducted to analyse the initial data. The purpose of this statistical procedure is to assist in establishing the plausibility of the theoretical model, and to estimate the degree to which the various explanatory variables seem to be influencing the dependent variables (Cooley, 1978). This study uses PASW version 18 software (formerly known as Statistical Package for Social Sciences or SPSS) to analyse the preliminary data, and structural equation modelling (SEM) using confirmatory factor analysis (CFA) to test the hypothesised model. This software which used to be known as SPSS is the most popular and powerful quantitative analysis software program used in social science research (George & Mallery, 1999; Miller & Acton, 2009) . It is comprehensive and flexible, and can be used with almost any type of file. It can be used to generate tabulated reports, charts, and plots of distributions and trends, as well as generate descriptive statistics and more complex statistical analyses.

Initially, 252 raw data received from the respondents was entered and checked manually into PASW Statistics 18, in the form of descriptive statistics. The purpose is to check all variables for any violation of the assumptions underlying the statistical technique that addresses the research question. This technique has also been used for data examination and screening in this study, in terms of missing values, normality, outliers, linearity and multicollinearity. Each of these methods have been further defined and described in Section 6.3. PASW Statistics 18 was also used to conduct preliminary data analysis on frequencies, mean and standard deviation, and descriptive statistics, to give the reader a ‘snapshot’ of data collected and used in the research.

5.3 Structural Equation Modelling (SEM)

Structural equation modelling (SEM) examines the structure of interrelationships among multiple variables, which are represented as observed variables and latent variables (Hair et al., 2010). SEM is a collection of statistical techniques that allows a set of relationships between one or more independent variables, either continuous or discrete, and one or more dependent variables, either continuous or discrete, to be examined (Tabachnick & Fidell, 2001). It is a prominent statistical data analysis technique used to develop and test theory as well as construct validation (Anderson & Gerbing, 1988).

SEM considers the analysis process as homogenous across all variables (Bentler & Chow, 1987). SEM examines both measurement and the structural models. SEM has been extensively applied in theory-testing and empirical model building in the social sciences and behavioural science. A number of researchers have extensively applied SEM in various disciplines over the past ten years, including business (McQuitty, 2004), marketing (Qureshi & Compeau, 2009), consumer research (Han et al., 2010) and operations management (Shah & Goldstein, 2006).

SEM can be specified to investigate measurement validation, to evaluate structural relationships among sets of variables, or to achieve both purposes simultaneously. It takes a confirmatory (i.e., hypothesis-testing), rather than exploratory approach to data analysis. The existence of variables with different roles and multiple dependence relationships in the conceptual model justified the decision to use SEM in this research. SEM consists of a family of statistical models which seeks to explain the relationships among multiple variables. It examines the structure of interrelationships expressed by a series of equations, similar to a series of multiple regression equations. These equations depict all the relationships among constructs (both the dependent and independent variables) involved in the analysis. Constructs are unobservable or latent factors represented by multiple variables, much like variables represent a factor in factor analysis (Hair et al., 2010).

There are many advantages of using SEM over some other multivariate analysis techniques. For instance, traditional data analyses are based on observed measurement only, whereas unobserved (latent) variables and observed variables can be incorporated in SEM (Byrne, 2001). Moreover Byrne (2001) mentioned SEM takes the measurement error associated with the indicators into account. Therefore, Byrne analysis provides more reliable estimates for the latent variables than classical psychometric methods, like exploratory factor analyses or simple computations of alpha reliabilities.

Specifically, SEM was chosen because of its distinguishing strengths and advantages listed below:

- Estimation of multiple and interrelated dependence relationships;
- Representation of unobserved concepts in these relationships, and the ability to correct for measurement errors in the estimation process;
- Definition and redefinition of a model to explain the entire set of the relationships;
- Performance of the moderating effect test of variables for all relevant relationship paths of the model.

These characteristics fit the context of this thesis, since correlation is the type of relationship under investigation, latent constructs with multiple manifest variables are involved, and the objective and focus is to develop the best model of the interrelationships among all the variables, not only the partial relationships between variables.

Two approaches can be used in order to perform SEM. These are one-stage or two-stage. The one-stage approach aims to process the analysis with simultaneous estimations of both structural and measurement models. On the other hand, the two-stage approach aims to process the measurement model first and then fix this measurement model in the second stage when the structural model is estimated. Further, the measurement model describes the relationships between a latent variable or theoretical construct and its observed variables or indicators (Gerbing & Anderson, 1988). The measurement model specifies the pattern by which each measure loads on a particular factor, and describes the measurement properties (reliability and validity) of the observed variables. The structural model defines the relationships or parts among latent constructs.

In this study, the two-stage approach recommended by Anderson and Gerbing (1982) was adopted to conduct the analysis for two reasons. First, it is widely accepted and used in supply-chain management research, particularly in supply chain relationships. Second, the accurate representation of the reliability of the items of each construct is best conducted in two stages, to avoid any interaction between measurement and structural models (Hair et al., 1995). That is, analysing the causal relationships in the structural model requires performing the measurement model first (further explained in Section 6.4), due to the latter representing a condition that must be satisfied as a matter of logical necessity (Bagozzi, 1981; Anderson & Gerbing, 1982). Construct validities of manifest measures are evaluated prior to evaluating hypotheses about relations between constructs. In other words, good measurement of the latent variables is a prerequisite for analysing the causal relations among the latent variables (Gerbing & Anderson, 1988).

The following sections highlight and discuss issues associated with structural equation modelling. These issues include SEM assumptions, sample size, model identification and estimation method. Additionally, SEM involves five steps; model specification, identification, estimation, assessment of the model suitability and model re-specification (which has also be described).

Following is the summary of procedures required to conduct SEM:

- Defining the constructs (i.e. dependent or outcome variables, latent endogenous variables, and latent exogenous variables) based on the conceptual model;
- Defining the variables in each construct;
- Assessing measurement model validity. Measurement model validity depends on suitability for the measurement model, and specific evidence of construct validity. The evaluation of suitability criteria has been further discussed in Section 5.3.8, and Table 5.2 (see Section 5.3.9) summarised the overall suitability employed in this thesis.
- Specifying the structural model;

This step is critical when developing an SEM model, because it specifies the structural model by assigning relationships from one construct to another, based on the proposed conceptual model. Structural model specification is focused on using the relationship type from the research model to represent the structural hypotheses of the research model. This means that each hypothesis represents a specific relationship that must be specified.

- Assessing structural model validity;

This final stage involves efforts to test the validity of the structural model and its corresponding hypothesised theoretical relationships. Two key differences arise when testing the fit of a structural model, relative to a measurement model. First, although an acceptable model fit must be established, alternative or competing models can be compared if a competing-models approach is taken. Secondly, particular emphasis is placed on the estimated parameters for the structural relationships because this provides direct empirical evidence relating to the hypothesised relationships depicted in the structural model. The overall SEM procedure employed in this thesis is summarised in Figure 5-1.

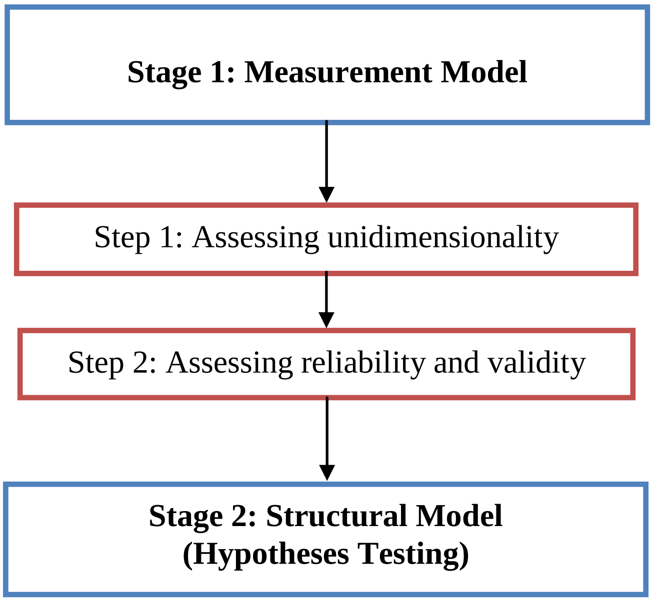


Figure 5-1: Two-Step Structural Model Used in this Thesis

5.3.1 SEM Assumptions

SEM shares three assumptions with other multivariate methods:

i. independent observations;

ii. random sampling of respondents; and

iii. the linearity of all relationships (Bentler & Chow, 1987; Hair et al., 1998).

In addition, the assumption of multivariate normality of distribution is important in using AMOS, which is the most widely used program for structural equation modelling (Arbuckle, 2005). assessment of the approximate normality of the data is important because model estimation and testing are usually based on the validity of this assumption; lack of normality adversely affects suitability indices and standard errors (Baumgartner & Homburg, 1996).

5.3.2 Model Identification

Model identification is defined as the extent to which the information provided by the sample data is sufficient to perform parameter estimation (Byrne, 2001). For the model to be identified, the number of parameters to be estimated should be less than or equal to the number of data variances and co-variances among the observed variables. For example, if the number of parameters to be estimated is t, the minimum condition for model identification is $t \leq s$, where $s = \frac{1}{2}(p+q)/(p+q+1)$, p is the number of y-variables and q is the number of x-variables (Zimmerman, 1989; Turner & Reisinger, 1999).

The number of indicators for each construct should be at least two items. three is more desirable, as using only two indicators increases the chances of deriving an infeasible solution, such as problems of under-identification that cause negative degrees of freedom (Hulland et al., 1996). Hair et al. (1998) suggested that five to seven indicators is a appropriate number of indicators to measure most constructs. This is discussed further in section 6.5.

5.3.3 Model Estimation

The main purpose of model estimation is to obtain estimates for all parameters to be estimated. There are several kinds of parameter estimation methods, such as two-stage least square (TSLS), maximum likelihood estimation (MLE), generalised least squares (GLS), and generally weighted least squares (WLS). This thesis employed the MLE estimation method, as MLE has been the most commonly used approach in SEM (Anderson & Gerbing, 1988).

According to Kline (2005), MLE maximises the continuous generalisation (likelihood), where the observed covariance or data are drawn from the research population. It offers minimum-variance unbiased estimates when sample size is increased, and becomes vigorous against violation on the assumption of data non-normality. MLE makes estimates based on maximizing the probability (likelihood) that the observed co-variances are drawn from a population assumed to be the same as that reflected in the coefficient estimates. MLE in SEM requires the assumption of multivariate normality, and is fairly robust against violations of normality.

5.3.4 Model Re-specification

A hypothesised model is incorrectly specified when it reproduces the sample covariance matrix poorly. Identifying the possible indication of misspecification may improve the model fit. Some indicators can be used to detect sources of model misspecification such as standardised residuals and modification indices (Anderson & Gerbing, 1988; Hair et al., 1998; Garver & Mentzer, 1999). An acceptable measurement of unidimensional constructs should result in relatively small standardised residuals and modification indices (Anderson & Gerbing, 1988; Hulland et al., 1996). The two diagnostics indicators are detailed as follows:

Standardised residuals

Examining standardised residuals is the soundest method of identifying the source of model misspecification. Residuals are viewed as diagnostics for investigating lack of fit (Browne et al., 2002). Standardised residuals indicate the differences between the observed correlation/covariance and the estimated correlation/covariance matrix (Hair et al., 1998). Large residuals (greater than 2.00 or 2.58) are indicative of a specification error in the model (Anderson & Gerbing, 1988; Garver & Mentzer, 1999).

Modification indices (MI)

The modification indices (MI) are measures associated with the fixed (not estimated) and constrained parameters of the model. A modification index represents the reduction in the value of chi square when the parameter is estimated or freed in a subsequently revised model (Anderson & Gerbing, 1988; Hair et al., 2010). The use of modification indices should have a theoretical justification for the estimated parameters in addition to statistical considerations (Anderson & Gerbing, 1988).

5.3.5 Adequacy of Sample Size

SEM is the most appropriate tool to analyse a large case. However, problems can occur, as a large number of indicator variables makes parameter estimation and model fit statistics unstable, unless the sample size is also large (Holmes-Smith & Rowe, 1994). These problems, however, are not the primary issue for a researcher dealing with small cases using SEM. Section 4.6.2 has discussed the appropriate sample size for SEM analysis, particularly using maximum-likelihood estimation.

5.3.6 Two-Step Approach: Measurement Model and Structural Model

Anderson and Gerbing (1988) first introduced the two-step approach that covered the application of confirmatory factor analysis (CFA) for each construct to determine the unidimensionality and model fit, including suitability, convergent validity and discriminator validity; and SEM to test the proposed hypotheses. This study also conducted the two-step approach. First is the CFA measurement model, and secondly, the structural model analysis. Both analysis and results will be discussed in Chapter 6.

5.3.7 Measurement Model Development

Some interrelated statistical techniques are used to analyse the data as a supportive stream in measuring the fit. This section explores the reliability scores for the construct measures followed by confirmatory factor analysis (CFA). The reliability tests examine the internal consistency of the items in a measure to determine whether each observed variable should be retained, or any exclusion should be done.

The process follows the development of an individual measurement model for each construct measure to CFA and the overall measurement model to check the dimensionality of the construct and validity of the measures. A two-stage approach proposed by Gerbing and Anderson (1988) was used in confirmatory factor analysis.

A. Construct Validity

The constructs of supply chain relationships were obtained based on extensive literature reviews. These were adapted to develop components of the integrative structural model, to gain an understanding of hypothesised relationships among constructs, indicators and items, but only if they confirmed construct validity. The importance of ensuring the validity of the constructs has been emphasised by a number of authors, to address the issues of weak validation experienced by many research studies (Churchill, 1979; Malhotra, 2004; Gallagher et al., 2008; Hair et al., 2010). In terms of broad conception, validity refers to the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration.

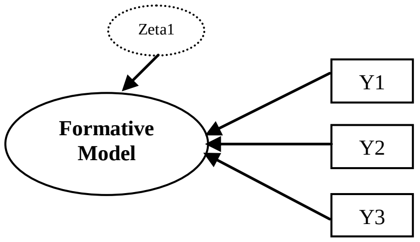
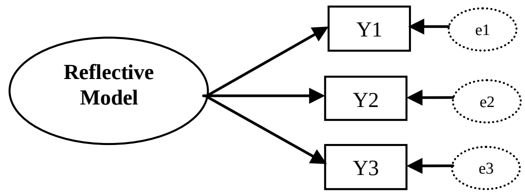
Through the implementation of CFA, construct validity in this study was first examined using a preliminary qualitative analysis to establish the framework of measurement model. This analysis was needed to determine whether the measurement model was to be constructed based on a reflective or formative model, particularly the constructs with multidimensional and multi-item structures. The implementation of each model would give different results, and therefore interpretation at this stage was crucially important.

In the reflective model, the latent variable influences the indicators, thus the direction of causality is from the construct to the indicators or measures; while in the formative model, the direction is from the measures to the construct (Jarvis et al., 2003).

A guideline proposed from Jarvis, Mackenzie and Podsakoff (2003) was used to establish the model. There were four criteria proposed by these researchers to determine whether the measurement model was reflective or formative. The first criterion relates to the direction of causality between the construct and its indicators. For reflective measurement models, the direction of causality flows from the construct to the measures, while the direction goes the opposite way for the formative models. The second criterion addresses the issue of the interchangeably of the indicators. The indicators need to be interchangeable for the reflective models, but not for formative models. The third criterion relates to the issue of whether the indicators should co-vary with each other. As for the reflective models, co-variation among the indicators is necessary, while in the formative models the covariance is unnecessary. The fourth criterion is referred to a question examining whether all measures are required to have the same antecedents and consequences.

Indicators in the reflective model should all have the same antecedents and consequences, because they reflect the same underlying construct and are believed to be interchangeable. On the other hand, the measures in the formative constructs do not have to be interchangeable, because they are not expected to have the same antecedents and consequences. Table 5-1 shows the difference between formative and reflective measurement models.

Table 5-1: Differences between Formative and Reflective Measurement Models

Formative Model	Reflective Model
	
• Direction of causality is from measure to construct	• Direction of causality s from construct to measure
• No reason to expect the measures are correlated (internal consistency is not applied) • However, attention should be given to nomological or criterion-related validity	• Measures are expected to be correlated (measures should possess internal consistency reliability)
• Dropping an indicator from the measurement model may alter the meaning of the construct	• Dropping an indicator from the measurement model does not alter the meaning of the construct
• Takes the measurement error into account at the construct level	• Takes the measurement error into account at the item level
• Constructs possesses surplus meaning	• Construct possesses surplus meaning
• Scale score does not adequately represent the construct	• Scale score does not adequately represent the construct

Source: Adapted from Jarvis et al.,(2003)

Applying the above criteria to the structure of partner's characteristics capability, alliance management capability and process capability, it was established that the measurement of these three constructs should be based on reflective models. Chapter 3 of this thesis describes the indicators of each construct from a broad perspective of literature and research done by previous authors. In summary, it can be concluded that the construction of these three measurement models need to apply the reflective model structure.

B. Model's Unidimensionality

Further analysis in this thesis on construct validity refers to related issues such as unidimensionality. The unidimensionality of the model must be examined to confirm that a set of measured variables (or indicators) can be explained by only one underlying construct (Hair et al., 2010) . It can also be referred to as an internal-consistency reliability that concerns the homogeneity of the items comprising a scale; items must be correlated well with each other (DeVellis, 2012). Anderson and Gerbing (1988) explain that both unidimensionality and reliability are related, but are determined in different ways. According to them, "the unidimensionality of a scale can be evaluated by examining the patterning of its component indicator correlations, whereas the reliability of a scale is determined by the number of items that define the scale and the reliabilities of those items" (Anderson & Gerbing, 1988, p. 190).

The assessment of the unidimensionality of each multiple-indicator construct should be performed prior to the assessment of construct reliability; both assessments (these being unidimensionality and construct reliability) are performed to confirm the usefulness of a scale (Anderson & Gerbing, 1988). Unidimensionality can also be measured through CFA to assess the internal and external consistency of a construct (Anderson & Gerbing, 1982; Anderson & Gerbing, 1988), and to analyse each measurement model for a first-order CFA construct. In this study, each critical factor of the research constructs was evaluated by factor analysing measurement instruments using Cronbach's alpha reliability tests. According to Churchill (1979), coefficient or Cronbach's alpha should be the first measure used to assess the quality of an instrument. A cut of point (α= 0.7) for the alpha value suggested by Nunally and Bernstein (1994) was used as a reasonable indicator of fit.

C. Convergent Validity

It is the degree to which measurement items of the same construct demonstrate a converged relationship, as indicated by the high proportion of variance shared among them. It refers to the extent to which multiple attempts measure the same concept with different methods are in agreement. To establish convergent validity, it is required to show measures that should be related are in reality related. This type of validity was observed in this thesis based on measurement model assessment conducted in accordance with the confirmatory factor analysis (CFA) procedure. The implementation of CFA to confirm convergent validity and evaluate a latent structure has received substantial justification in the literature (Churchill, 1979; DiStefano & Hess, 2005; Byrne, 2010).

As outlined in the CFA procedure, this thesis applied three assessment schemes to ensure convergent validity. First, the convergent of a common was assessed based on standardised factor loadings, which should be above 0.50 with statistical significance (Hair et al., 2006, 2010). Second, convergent validity was verified through the assessment of Average Variance Extracted (AVE), which had to be more or equal than 0.50 in order to achieve an adequate level (Fornell & Larcker, 1981; Vázquez-Carrasco & Foxall, 2006; Hair et al., 2010). Finally, the convergence was also reflected by measure of composite reliability (CR) which is greater than 0.7 and more than the construct's AVE value.

D. Discriminant Validity

Discriminant validity is the degree to which a concept differs from other concepts (Hair et al., 2010). It is the analysis of the distinction between two constructs, confirming that the hypothesised structural parts are free from discrepancy, and lead to an accurate result (Farrell & Rudd, 2009); this will allow greater confidence on the later interpretation of analysis findings (Farrell & Rudd, 2009). The observation of discriminant validity in this study was conducted by comparing square root of AVE with correlations shared between each indicator and the other indicator of the model (Fornell & Larcker, 1981; Vázquez-Carrasco & Foxall, 2006). A condition where the square root of AVE for each of the factors is greater than its shared variance with any of the other factors substantiated the discriminant validity (Fornell & Larcker, 1981; Schumacker & Lomax, 2008).

The above explained validity assurance must also be supported by adequate fit of each measurement model. To achieve this, an examination of model fit was performed. The fit indices summarised in Table 5.2 (see section 5.3.9) were used for this purpose. A fulfilment of the acceptable cut-off level of at least one commonly used index determined the model fit.

5.3.8 Evaluation of Goodness-of-Fit Criteria

The determination of model fit is important to determine the suitability between the theoretical model and the sample data. The determination of model fit in SEM is not as straightforward as in other multivariate statistical tests. There is no single statistical test of significance for SEM fit indices to identify a correct model given the sample data, especially given the existence of equivalence or alternative models that yield exactly the same data-to-model fit (Schumacker & Lomax, 2004; Byrne, 2010).

Once the theoretical model is specified, testing its plausibility based on the sample data is then performed for the purpose of evaluating the adequacy of the suitability between the hypothesised model and the sample data (Byrne, 2001). In structural equation modelling, the major task of the estimation process is to minimize the discrepancy between the predicted covariance matrixes.

The use of SEM has steadily increased in the business literature, wherein three forms of SEM are identified. The first form consists of measurement models (Type 1), the sequential next form is structural models (Type 2), and Type 3 combines measurement and structural parameters in a single analysis (McQuitty, 2004). In this study, the research paradigm specifies and strives to test using Type 1, followed by a Type 2 approach. SEM is a quantitative data analytical technique which specifies, estimates, and tests theoretical relationships between observed endogenous variables and latent, unobserved exogenous variables (Byrne, 2001). While SEM does not designate a single statistical technique but rather a family of relevant procedures, including analysis of covariance structure which combines regression and factor analysis. The SEM approach starts with model specification that links the variables assumed to affect other variables and directionalities of those effects (Kline, 2005). In the estimation process, SEM produces regression weights, variances, covariance, and correlations in its iterative procedures converged on a set of parameter estimates (Holmes-Smith et al., 2004).

Many criteria are used to measure goodness-of-fit. While each model-fit measure is unique, they can be categorised into three groups: absolute, incremental and parsimony-fit measures (Byrne, 2010; Hair et al., 2010). Hair et al. (2010) also state that it is acceptable to combine various model-fit criteria as an evaluation of global-fit measures. It is important to decide on the use of one or more appropriate fit indexes, as some critical factor may influence the performance of fit indices on evaluating model fit (Hu & Bentler, 1995). Through the process of estimation, suitability statistics should be evaluated to check whether the proposed model fits to the data or not, or whether any modification is required to increase it. The model suitability statistics can be divided into three types (Holmes-Smith et al., 2004). The basic types are as follows (which are discussed further in Section 5.3.9):

- Absolute Fit Indices;
- Incremental Fit or Comparative Fit Indices (C.F.I.);
- Indices of Model Parsimony.

In each of those types, there are different fit indices and some rules of thumb about the required minimum level of score/value for acceptable suitability (Byrne, 2001). However, researchers emphasize that many different fit indices are found to have some problems in the evaluation process (Kline, 2005), because different fit indices are reported in different articles and different reviewers of the same manuscript suggest the indices that they prefer (Maruyama, 1998; Ping Jr., 2004). For example, Kenny and McCoach (2003) argue that there is no consistent standard for evaluating a acceptable model, and they only emphasised CFI, TLI, and RMSEA as commonly fit indexes. Steenkamp et al., (2003) stressed χ^2, CFI and TLI as fit measures to test moderating effects of their proposed model. Further, McQuitty (2004) synthesised suitability statistics which are less sensitive to sample size.

Accordingly, as recommended by Holmes-Smith et al (2004) and Hulland et al. (1996) it is unlikely that all of those measures will be found in one report. However, a subset or sample of fit indices from major categories has been reported in this study to assess the degree of overall fitness of the measurement model, and the structural model. Taking sample sensitivity and model complexity effect into account, AGFI, NNFI, CFI, RMSEA and CMIN (χ^2/df) are considered in this study for evaluating fit indices, because these have been commonly used and reported in the literature (Hulland et al., 1996).

5.3.9 Overall Model Fit

A number of suitability criteria have been used to assess the overall fit of the hypothesised SEM model. suitability measures the extent to which the actual or observed covariance input matrix corresponds with (or departs from) that predicted from the proposed model (Ho, 2006). Goodness-of-fit measures can be classified into three types:

i. absolute fit measures to assess the overall model fit;
ii. incremental fit measures to compare the proposed model to a comparison model; and
iii. Parsimonious fit measures to adjust the measures of finest to compare models with different numbers of coefficients, and determine the fit achieved by each coefficient.

A. *Absolute Fit Measures*

Absolute fit indices determine how well a priori model fits the sample data (McDonald & Ho, 2002) and demonstrate which proposed model has the most superior fit. These measures provide the most fundamental indication of how well the proposed theory fits the data. In this category, the model fit guidelines used are the chi-squared test, RMSEA, GFI and AGFI.

The chi-square (χ^2) is considered the most fundamental measure of overall fit (Bollen, 1989). This is a test of whether the matrix of implied variance and covariance ($\sum$) is significantly different to the matrix of empirical sample variance and covariance (S). If the probability (P) is greater than 0.05, this indicates that the discrepancy between $\sum$ and S is very small, meaning that the actual and predicted input matrices are not statistically different. Although this type of statistical index is the most important one to evaluate model fitness, it has been criticised for being too sensitive to sample size (Fornell & Larcker, 1981; Marsh & Balla, 1994; Hu & Bentler, 1995). Thus, researchers do not solely use the value of chi-square to reject or accept their models, but use in conjunction with other indices to evaluate overall fit.

The second measure of absolute fit indexes used within this study is the Root Mean Square Error of Approximation (RMSEA). This measure assists in correcting the tendency of chi-square to reject specified models. It takes into account error approximation in the population. Holmes-Smith et al. (2006) recommend that RMSEA should be less than 0.05, while Brown and Cuddeck (1992) as reported in Bollen and Long (1993) recommend that a absolute RMSEA value of less than 0.05 indicates a close fit, and less than 0.08 suggests a reasonable fit. However, it has been found that a value ranging from 0.05 to 0.08 is commonly acceptable (Hair et al., 1995).

The third measure of absolute fitness index used is the Goodness-of-Fit Index (GFI). The Goodness-of-Fit statistic was created by Jöreskog and Sörbom (1981) as an alternative to the Chi-Square test, and calculates the proportion of variance that is accounted for by the estimated population covariance (Tabachnick & Fidell, 2007). The GFI measure indicates the relative amount of variance and covariance together explained by the model (Byrne, 1989). The GFI value is calculated by comparing the discrepancy value for the model under test to the discrepancy value for a saturated version of the model, which is counted as representing a 100% fit or 1.0. However, this measure is not adjusted for degrees of freedom (Hair et al., 1995), ranging from 0 (indicating a poor fit) to 1 (indicating a perfect fit), where a recommended level of acceptance is 0.90 (Kline, 2005; Schumacker & Lomax, 2008; Byrne, 2010).

B. Incremental Fit Measures

The second category of indices includes incremental fit measures. Related to the GFI is the Adjusted Goodness-of-Fit Index (AGFI) which adjusts the GFI based upon degrees of freedom, with more saturated models reducing fit (Tabachnick & Fidell, 2007). Thus, more parsimonious models are preferred, while penalised for complicated models. In addition to this, AGFI tends to increase with sample size. As with the GFI, values for the AGFI also range between 0 and 1, and it is generally accepted that values of 0.80 or greater indicate well-fit models (Chau & Hu, 2001). Given the often detrimental effect of sample size on these two fit indices, they are not relied upon as a stand-alone index, however given their historical importance, they are often reported in covariance structure analyses (Hooper et al., 2008).

In addition to AGFI, Normed Fit Index (NFI) is one of the most popular incremental measures (Hair et al., 1995; Byrne, 2001). NFI reflects the proportion to which the researchers' model fits compared to the null model. For example, NFI= 0.50 means the researcher's model improve fitness by 50%. However, this index does not control the degrees of freedom (Bollen, 1989). A major drawback to this index is that it is sensitive to sample size, underestimating fitness for samples less than 200 (Mulaik et al., 1989; Bentler, 1990). accordingly, it is not recommended to be solely relied on (Kline, 2005). This problem was rectified by the Non-Normed Fit Index (NNFI), also known as the Tucker-Lewis Index (TLI), which prefers simpler models. In order to overcome NFI's shortcomings, Bentler (1990) has used it with the Comparative Fit Index (C.F.I.).l The CFI compares the covariance matrix predicted by the model to the observed covariance matrix. However, only NNFI and CFI are reported in this thesis. They ranged from 0 (poor fit) to 1 (perfect fit), having commonly recommended a level of 0.90 or greater (Hair et al., 1995).

C. Parsimony Fitness Measures

According to Hair et al., (1995), the third category of parsimonious fit indices tests the parsimony of the proposed model by evaluating the fitness of the model to the number of estimated coefficient required to achieve the level of fit. In this category, the normed chi-square (χ^2/df) - also known as CMIN – is the most popular parsimonious fitness index used to evaluate this model. In this measure, a range of acceptable values for the

χ^2/df ratio have been suggested, ranging from less than 3.0 (Carmines & McIver, 1981). This thesis has used this measure as an indicator of overall fit, in conjunction with other measures, not as a basis for rejecting or accepting the model.

As a summary, in SEM, there are a series of goodness-of-fit indices, which identify whether the model fits the data or not. There are many indices provided by SEM, although there is no agreement among scholars as to which fit indices should be reported. For example Anderson and Gerbing (1988) suggest that researchers might assess how well the specified model accounts for data with one or more overall goodness-of-fit indices. Kline (1998) recommends at least four, such as GFI, NFI or C.F.I., NNFI and SRMR In order to reflect diverse criteria and provide the best overall picture of the model fit, Jaccard and Wan (1996), Bollen and Long (1993), Hair et al. (1995), and Holmes-Smith et al., (2006) recommend the use of at least three fit indices by including one in each category: absolute; incremental; and parsimonious which are discussed below.

This study adopts those measures most commonly used in supply chain and logistics research to evaluate models in which the three categories are reflected. Table 5-2 reports SEM fit indices reported in this study. As outlined in the table, the first category of absolute values includes chi-square (χ^2), GFI, and RMSEA; the second category (incremental) includes AGFI, NFI, CFI, TLI the third category (parsimonious) includes χ^2 / df. These are described in more detail below.

Table 5-2: Goodness-of-Fit (GOF) Statistics Used in the Thesis

Statistics	Fit Criteria	Comments
Absolute fit indices		
Chi-square (χ^2)	p>0.05	This measure is sensitive to large sample sizes
Goodness-of-Fi (GFI)	0.90 or greater	Value close to 0 indicates poor fit, while value close to 1 indicates a perfect fit
Root Mean Square Error of Approximation (RMSEA)	$\leq$0.08	Value up to 1.0 is considered acceptable
Incremental fit Indices		
Adjusted Goodness-of-Fit (AGFI)	0.80 or greater	Value close to 0 indicates a poor fit, while close to 1 indicates a perfect fit
Tuker-Lewis Index (TLI)	0.90 or greater	
Normed Fit Index (NFI)		
Comparative Fit Index (CFI)		
Parsimonious fit indices		
Normed Chi-square (χ^2 / df)	1.0$\leq \chi^2$ / df $\leq$5	Lower limit is 1.0, upper limit is 3.0 or as high as 5.0

Source: Adapted from Hair and Black (2006), Chau and Hu (2001), Brown and Cudeck (1993), Bagozzi and Yi (1988), Bentler and Bonnet (1980)

5.3.10 Multigroup Analysis

Multigroup analysis is growing in popularity. It is recommended by Hair et al.,(2010) as it is a reliable technique to determine the equivalence or invariance of the measurement. Similarly, Chen et al.(2005) states that tests of measurement invariance are important to assess group comparison. Netemeyer et al. (Netemeyer et al., 2003) assert that multigroup analysis provides a powerful test of the invariance of factor loadings, factor variance and covariance (correlations), as well as error terms for single-scale items. Hence, scale generalisability is enhanced once the existence of invariance can be proven (Bollen, 1989; Marsh et al., 1998). To this end, the equivalence of two or more independent groups will be measured prior to structural multigroup analysis, to ascertain that the different groups will assess the same construct.

The objective of this study is to empirically investigate the antecedents of supply chain relationships in agile environments from the dyadic perspective. Multigroup analysis is used to make comparison between two independent groups: MNCs and SMEs. The equivalence of two or more independent groups will be measured prior to structural multigroup analysis, to ascertain that the different groups will assess the same constructs.

5.4 Summary

This chapter analysed the analytical procedures used to justify the data analysis, and as a major reference to the development of the next chapter. It described a number of issues pertaining to SEM which may arise in the analysis stage, such as the threshold value used to determine model fit. It also discussed the justification for the use of some procedures and steps of the analysis.

The chapter started with a discussion of the data preparation procedures for the 252 data sets. The procedure discussed included verification of data values through screening and cleaning the data before proceeding to the main analysis. The major focus for this chapter was the use of structural equation modelling (SEM) to analyse the measurement and structural models for the study. Section 5.3 emphasised issues of SEM and its applicability to this study, including the two-step approach of measurement and structural model. This chapter pointed out the adequacy of sample size for SEM analysis and the Likert Scale as the focal point to this study.

This chapter discussed the use of the maximum likelihood estimation (MLE) technique to avoid significant degrees of violation and the use of second-order construct models to translate the research questions into research objectives. It also analysed the use of multidimensional constructs focusing on the reflective at first-order and second-order construct. To evaluate the goodness-of-fit, six model-fit criteria were chosen which covered absolute, incremental and parsimonious goodness-of-fit indices.

The next chapter will discuss on the data analysis and results, initiating with the preliminary data analysis, unidimensionality using confirmatory factor analysis (CFA) and the structural model.

CHAPTER SIX

DATA ANALYSIS AND RESULTS

6.1 Introduction

Chapter 5 provided the summary of the primary research methodology undertaken for analytical procedures, with references for the statistical terms and techniques that were comprehensively used in this study. The aim of this chapter is to present the data analysis based on five main steps:

1. Preliminary data cleaning and preparation;
2. Confirmation of dimensionality;
3. Measurement model assessments;
4. Structural model fit; and
5. Multigroup analysis.

This chapter clarifies the data analysis employed in Section 6.1, before describing the sample demographic of the respondents in 6.2. Section 6.3 discusses the preliminary data-examination procedures. The structural equation modelling procedure is initialised with a detailed description of confirmatory factor analysis in Section 6.4; measurement models in Section 6.5; and Structural Equation Modelling in Section 6.6. Multigroup analysis – which is an additional analysis undertaken for this study – is further described in Section 6.7. The chapter is concluded with the overall summary in Section 6.8.

6.2 Sample Demographic and Data Screening

The profile of respondents and the participating firms are explored as part of the data assessment. As this study used a survey questionnaire with the drop-and-collect method (Brown, 1993; Ibeh et al., 2004; Maclennan et al., 2011), response error is an issue, as the researcher has no control over how it is completed. Hence, the relevant data-screening techniques – such as descriptive statistics, treatment of missing values (if any) and identifying outlier cases – are discussed in this section.

6.2.1 Response Rate

The survey was conducted in two phases. In Phase 1, questionnaires were distributed between December 2010 and February 2011. Of the 600 identified respondents who received the questionnaires during phase 1, a total of 135 responded, of which 67 were MNCs and 68 were SMEs respectively. This outcome was lower than the expectation for the drop-and-collect method. A follow-up survey was conducted between March and April 2011, which generated another 117 responses from 66 MNCs and 51 SMEs. Overall, the total response rate for this study is 42%, with 252 respondents.

Table 6-1 presents the breakdown of respondents for Phase 1 and Phase 2 of the data collection. The low yet satisfactory response rates may be due to the timing of data collection. The period between December 2010 and April 2011 was the end of year financial closing period for organisations. Respondents may have limited time and busy schedules to answer questionnaires on broad supply chain relationship issues. However it is believed that the drop-and-collect method used in the survey contributed to this satisfactory response rate. With this survey method, respondents were identified and contacted personally, prior to the distribution of the questionnaires. Respondents were given 3 days to complete the questionnaires. Completed questionnaires were personally collected from the respective identified respondents.

Table 6-1: Breakdown of Respondents by Timing of Data Collection

	Phase1 (Dec 2010-Feb 2011)	Phase 2 (March-April 2011)	Total	Response Rate (%)
MNCs	67	66	133	52.8
SMEs	68	51	119	47.2
Total	**135**	**117**	**252**	**100.0**

The summary of locations and respondents for the study is shown in Table 6-2. A total of 212 (84.2%) respondents were received from the central region (Petaling Jaya Free Trade Zone, Technology Park Malaysia and Shah Alam Industrial Zone) as these are the earlier-established and pioneer MSC zones, where majority of the Malaysian electrical and electronics businesses located. Northern and Southern regions are the newly recognised MSC zones for MSC-status manufacturers, especially for electrical and electronics products.

Table 6-2: Locations and Numbers of Respondents

No	Location	Region	No. of Respondents	Frequency (%)
1	Penang Cybercity	Northern	20	7.9
2	Kulim High Tech Park	Northern	8	3.2
3	Petaling Jaya Free Trade Zone	Central	43	17.1
4	Technology Park Malaysia	Central	61	24.2
5	Shah Alam Industrial Zone	Central	108	42.9
6	Melaka International Trade Centre	Southern	12	4.7

6.2.2 Demographic Profile of Respondents

The demographic profiles of 252 respondents who participated in the survey are reported in Table 6-3. Out of the 252 respondents, 52.8% (133) of the respondents were the MNCs and 47.2% (119) were the SMEs. Analysing the MNCs respondents, the majority of the respondents were executive officers (23.3%) followed by managers (21.8%). Most respondents were attached to operations department (33.1%) and mostly had completed graduate studies (69.9%). Respondents who had managerial experience numbered 85% of them, with 37.6% between 6-10 years of managerial experience in production, supply chain and operations management. Among the respondents, 75.2% had managerial experience in the electrical and electronic or ICT industry, the majority (41.4%) with 2-5 years of experience.

As for SMEs, the majority of the SMEs respondents were executive officers (29.4%). Most respondents were attached to the production (31.1%) and supply chain departments (31.1%). The respondents who had completed their graduate studies contributed 74.8% of the total SME respondents. Respondents who had managerial experience numbered 89.1%, and 42% of them had between 2 to 5 years of managerial experience in production, supply and operations management. Among 119 SMEs respondents, only 88 (73.9%) had managerial experience in the electrical and electronics or ICT industry, and most (40.3%) had between 2 to 5 years of experience. The description of respondents' profiles disclosed that the survey was participated by respondents whom majority have experience in the electrical and electronics industry in Malaysia.

Table 6-3: Descriptive Statistics of Respondents' Profile

	TOTAL RESPONDENTS		BUYER (MNC) (n=133)		SUPPLIER (SME) (n=119)	
POSITION	**No**	**%**	**No**	**%**	**No**	**%**
Executive Officer	66	26.2	31	23.3	35	29.4
Senior/Higher Executive Officer	29	11.5	22	16.5	7	5.9
Assistant Manager	19	7.5	15	11.3	4	3.4
Manager	45	17.9	29	21.8	16	13.4
Senior Manager	26	10.3	12	9.0	14	11.8
Head of Unit	20	7.9	6	4.5	14	11.8
Head of Department	22	8.7	12	9.0	10	8.4
Deputy Director	7	2.8	4	3.0	3	2.5
Director	18	7.1	2	1.5	16	13.4
DEPARTMENT	**No**	**%**	**No**	**%**	**No**	**%**
Production	66	26.2	29	21.8	37	31.1
Supply Chain	63	25.0	26	19.5	37	31.1
Operations	70	27.8	44	33.1	26	21.8
Procurement	39	15.5	25	18.8	14	11.8
Others	14	5.5	9	6.8	5	4.2
EDUCATION	**No**	**%**	**No**	**%**	**No**	**%**
Post-graduate	38	15.1	29	21.8	9	7.6
Graduate	182	72.2	93	69.9	89	74.8
Diploma	32	12.7	11	8.3	21	17.6
Post-Secondary	0	0	0	0	0	0
Secondary	0	0	0	0	0	0
MANAGERIAL EXPERIENCE	**No**	**%**	**No**	**%**	**No**	**%**
Yes	219	86.9	113	85	106	89.1
No	33	13.1	20	15	13	10.9
MANAGERIAL EXPERIENCE IN PRODUCTION/SUPPLY CHAIN/OPERATIONS	**No**	**%**	**No**	**%**	**No**	**%**
1 year or less	18	7.1	8	6.0	10	8.4
02-05 years	86	34.1	36	27.1	50	42.0
06-10 years	79	31.4	50	37.6	29	24.4
11-15 years	27	10.7	14	10.5	13	10.9
16 years above	9	3.6	5	3.8	4	3.4
Not Applicable	33	13.1	20	15.0	13	10.9
MANAGERIAL EXPERIENCE IN E&E and ICT INDUSTRY	**No**	**%**	**No**	**%**	**No**	**%**
Yes	188	74.6	100	75.2	88	73.9
No	64	25.4	33	24.8	31	26.1
MANAGERIAL EXPERIENCE IN PRODUCTION/SUPPLY CHAIN/OPERATIONS	**No**	**%**	**No**	**%**	**No**	**%**
1 year or less	36	14.3	15	11.3	21	17.6
02-05 years	103	40.9	55	41.4	48	40.3
06-10 years	47	18.7	28	21.1	19	16.0
11-15 years	2	0.8	2	1.5	0	0
16 years above	0	0	0	0	0	0
Not Applicable	64	25.4	33	27.8	31	26.1

6.2.3 Verification of Non-response Bias

To ensure that the sample of responses obtained was representative of the population, non-response bias was examined through comparison of early (Phase 1) and late responses (Phase 2) of returned surveys (Armstrong & Overton, 1977). To assess non-response bias on the timing of data collection, two sample t-tests assuming equal variance were conducted for responses received in the Phase 1 and Phase 2 (follow up) of data collection. The outcome of this test determined which of the t-values the correct values for interpreting the result were.

Responses between Phase 1 and Phase 2 respondents were compared using two tailed t-statistics across all the variables included in the survey ($p<.05$). The results of Levene's Test for equality of variances show p-value (0.735) is higher than alpha 0.05, thus equal variances are assumed (Pallant, 2011). The null hypothesis that the two groups (Phase 1 vs. Phase 2) are equal is not rejected, and concluded that there is no statistically significant difference (at $p<0.05$) among the identified variables, suggesting that non-response may not be a concern in this study. The result is presented in Table 6-4.

An independent sample t-test was also conducted, to compare the total scores of all measured variables for MNCs and SMEs. The objective is to determine whether there is a statistically significant difference in the mean scores of all variables for the two groups (Phase 1 and Phase 2). T-test for equality of means shows p-value (0.038) is less than the alpha value 0.05. It is concluded that there is a significant difference in the means score for a total score between MNCs and SMEs. However, the magnitude of difference in the means is very small (t=2.07, n1=133, n2=119). This is proven with the eta squared calculation on the effect size for the independent samples t-test.

$$\text{Eta squared} = \frac{t^2}{t^2 + (n1+n2-2)}$$

Eta squared of this test is 0.017, which explains that only 1.7 percent of the variance in total score is explained by group. Using the guideline proposed by Cohen (1988), the value 0.01 is interpreted as having small effect.

Table 6-4: Results of two sample t-tests assuming equal variance

		p-value	Between Two Groups
Levene's test for equality of variances	Sig	0.735	0.001
T-test for equality of means	Sig. (2-tailed)	0.038	0.05*
Effect Size	(Eta squared)	-	0.017

* Significant at p< 0.05

6.3 Data Examination and Cleaning

The data analysis is preceded with the examination of data-entry and data-cleaning. This is significantly relevant to gain some critical insights into the data characteristics and analysis (Hair et al., 2010). Accordingly, to gain a high level of accuracy in the data-entry process, a double-check procedure is performed. The first check involved verifying all entries case-by-case and as a second check, descriptive statistics for continuous data, including frequency distribution, maximum and minimum value, mean and standard deviation were conducted and verified. The frequency distribution statistics yielded no mistakes in the data-entry process, and ensured the accuracy of the data of 100%.

Given a strong underlying assumption of multivariate normality demanded of the SEM methodology employed in this study, with violation of this assumption leading to incorrect interpretation of findings, and the fact that case outliers can often seriously distort model fit, it behoves the researcher to scout data prior to testing of a specified model. Data gathered from the survey is screened for missing values, normality, outliers, linearity and multicolinearity. The objective is to avoid failure of the model estimation and crashing of fitting programs (Kline, 2005).

6.3.1 Assessment of Missing Values

The problem of missing values commonly occurs in research studies involving questionnaire-based surveys, where there are many items to be answered by the respondents. The appropriate treatment needed to resolve this problem depends on the patterns of the missing values (Tabachnick & Fidell, 2011). Removing the missing values that are randomly distributed is considered acceptable, and can improve the overall data structure. Meanwhile, fixing the missing values with a systematic pattern could generate biased results.

The survey activity conducted in six multimedia super corridor (MSC) zones in Malaysia resulted in 252 completed questionnaires, providing the required information with no missing data for the variables measured by the Likert Scale. This may be due to the drop-and-collect method, which enables the researcher to deliver and collect the completed questionnaires personally, as explained in section 4.4.1. The researcher has the chance to check the completed questionnaire for missing values. Furthermore, the instructions given on the questionnaires are clearly written, and respondents are given the opportunity to clarify with the researcher for any ambiguity regarding the questions.

6.3.2 Assessment of Normality

The examination of data normality is needed to comply with the SEM procedure. Normality in the data is often a conventional assumption in the estimation process (Bai & Ng, 2005). Infraction of normality affects the interpretation of analysis results (Hair et al., 2010). Normality can be examined at univariate and multivariate levels. At the first level, normality is examined based on the distribution of individual variables. Later, it is tested based on a combination of two or more variables.

As suggested by Hair et al.,(2010) a normal data distribution can be examined based on skewness and kurtosis values. Data distribution with either a highly skewed nature or with high kurtosis is indicative of non-normality, which has random effects on specification or estimation (Hall & Wang, 2005). This non-normality may exist due to the presence of outlier cases in the data set. This is explained in the next section. An attempt was made to assess the normality of the data. At the first stage, descriptive statistics analysis using the mean score of components of dependent and independent variables is conducted, and it found that the kurtosis scores of all variables are less than 3, as shown in Table 6-5.

Table 6-5: Descriptive Statistics

Variables	Minimum	Maximum	Mean	SD	Skewness	Kurtosis
PCC	31.00	59.00	48.4722	6.01618	-.694	-.336
AMC	26.00	49.00	40.1468	4.91342	-.558	-.506
PC	38.00	68.00	56.4286	6.74573	-.533	-.643
SCAP	8.00	20.00	16.2421	2.20126	-.679	.066
SCOP	6.00	20.00	16.4722	2.38422	-.844	1.235
SCFP	6.00	15.00	12.3532	1.84193	-.711	.552

The results confirm that multivariate non-normality does not exist in the data set, because all skewness values fall within an acceptable range of -1 to +1 (Hair et al., 2010) and the kurtosis scores for all the variables including the dependent variables do not exceed the maximum level of normality range (≤3), and have no effect on the overall findings of the study.

A further test on residuals also screened for normality via expected normal probability, and de-trended normal probability plots. When residual plots appear normal in regression, it is not necessary to screen individual variables for normality (Pallant, 2011). An examination of normal probability plots suggests no significant deviations from normality for the present data. The results are shown in Section 6.3.4.

6.3.3 Assessment of Outliers

An outlier is a case with such a extreme value on one variable (a univariate outlier) or such a strange combination of scores on two or more variables (multivariate outlier) that they distort statistics (Tabachnick & Fidell, 2011). Cases with scores that are very different from the rest are considered outliers (Kline, 2005). Identifying the presence of outliers in the data is necessary, since they could cause errors(s) in fitting the model estimation, parameter estimation, and standard error estimation (Gallagher et al., 2008).

Outliers can be detected by examining both scatter plots of standardised residuals and Mahalanobis Distance (D) statistics. For the former, residuals should be rectangularly distributed, with most scores concentrated in the centre (along the zero point) (Tabachnick & Fidell, 2007). Deviations from the centralised rectangle violate this assumption (Tabachnick & Fidell, 2007). This deviation is absent in this report as D statistics is chosen to detect outliers in this study.

D statistics indicate the distance in standard deviation units between a set of scores (vector) for an individual case and the sample means for all variables (centroids) (Kline, 2005). D is distributed as a chi-square variable, with a degree of freedom equal to the number of independent variables (Tabachnick & Fidell, 2011). To determine which cases are multivariate outliers, the researcher identifies the critical chi-square at the desired alpha value (values larger than a critical value are considered multivariate outliers). A further attempt is made to identify the specific cases with extreme values, and different from the rest. This process is preceded by identifying multivariate outliers evaluating D = 16.27 ($p < 0.001$) which is greater than critical value (3) (Tabachnick & Fidell, 2007).

There are three independent variables in this study such as partners' characteristics capability (PCC), alliance management capability (AMC) and process capability (PC). The results indicate the maximum D-value in the data file is 82.913, which far exceeds the critical value of 16.27. Further analysis is carried out using Cook's Distance to check whether this outlier is having undue influence on the results as a whole. According to Tabachnick and Fidell (2007), cases with values larger than 1 are a potential problem. The maximum value for Cook's Distance in this data set is 0.122, suggesting no major problems. Therefore, all the 252 cases are free from outliers, and remained in the data set. Test results show that the statistical assumptions are not violated.

6.3.4 Assessment of Linearity

Linearity is an essential requirement for performing factor analysis procedures. It is examined on independent variables separately. Figure 6-1, Figure 6-2 and Figure 6-3 are the output from the regression analysis, which displays the normal P-P plot of items for partner's characteristics capability (PCC), alliance management capability (AMC) and process capability (PC) respectively. The results confirm linear relationships between the dependent and independent variables in each level of model, and that the distribution of scores was normal.

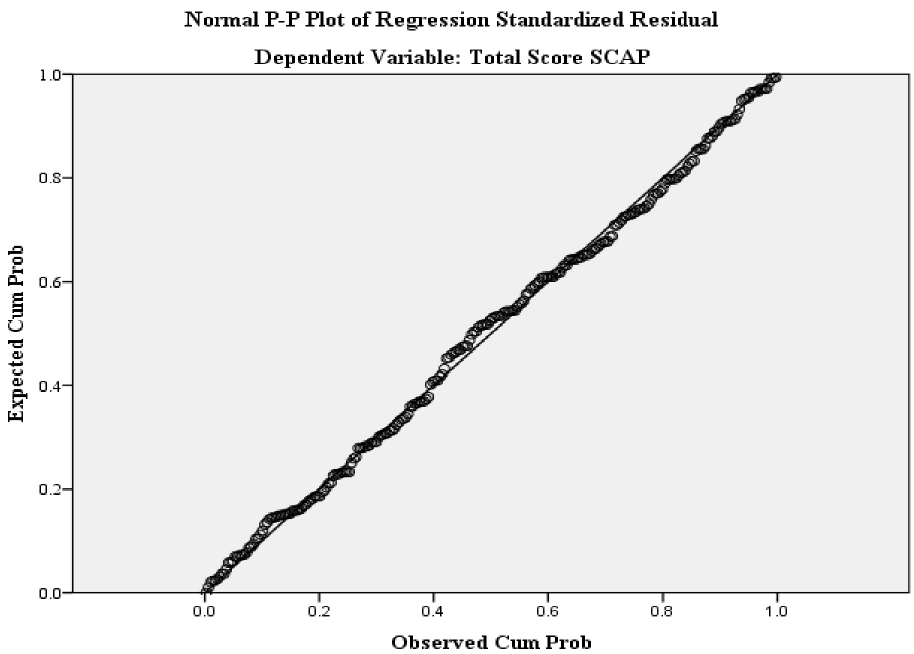


Figure 6-1: Normal P-P Plot of Partner's Characteristics Capability (PCC)

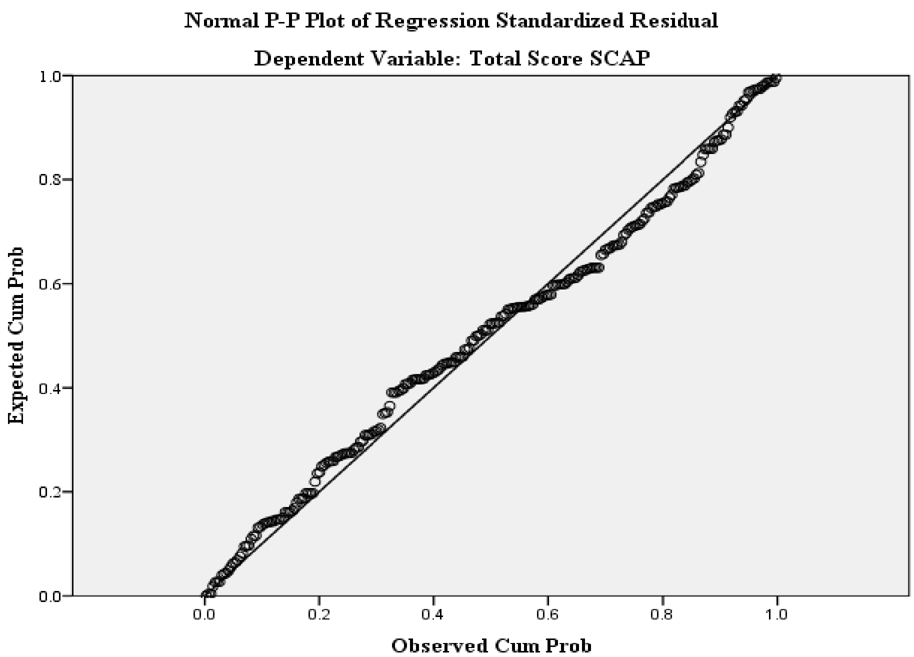


Figure 6-2: Normal P-P Plot of Alliance Management Capability (AMC)

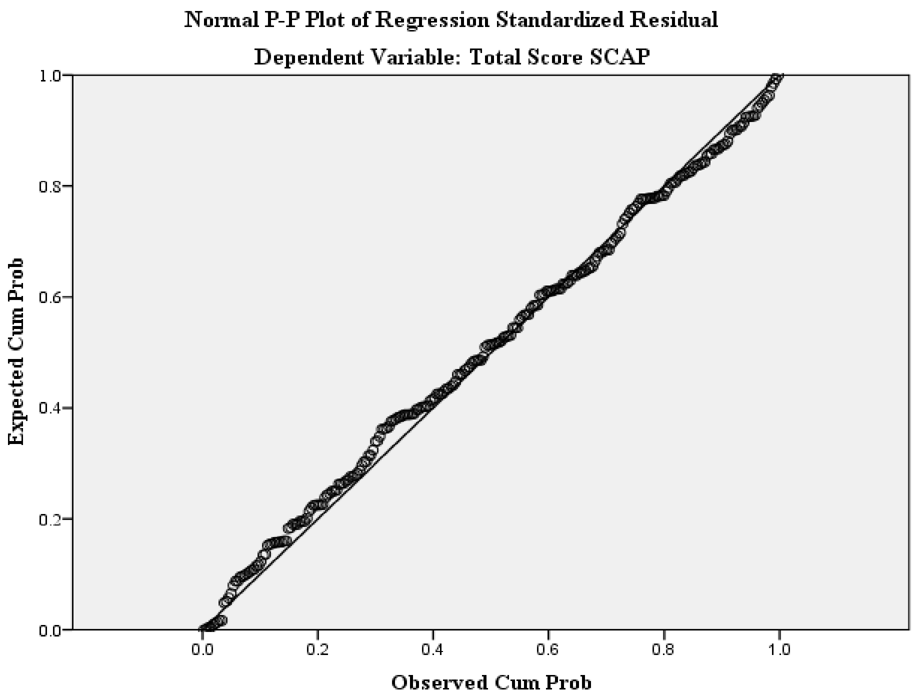


Figure 6-3: Normal P-P Plot of Process Capability (PC)

6.3.5 Assessment of Multicollinearity

Hair et al. (2010) define multicolinearity as the extent to which any variable's influence can be explained by other variables in the analysis. The ability to specify and further define any variable's effect will become more difficult as multicolinearity increases. Multicolinearity is identified through squared multiple correlations which are close or equal to 1. The assessment of multicolinearity is more strictly applied at the construct level. At the item level under the same construct, it is allowed to occur for the purpose of exploration of dimensionality. Assumptions for multicolinearity are tested via correlation matrices and co-linearity diagnostics. Tabachnick and Fidell (2007) suggest that researchers should omit highly correlated variables (> 0.7).

For this study, correlation values are calculated for PCC, AMC and PC. The correlation values range between 0.214 and 0.705 for PCC, between 0.222 and 0.549 for AMC, and between 0.166 and 0.654 for PC. The correlation values for the constructs' items fall into low to middling values. No items are found to be highly correlated, indicating that the data has no multicolinearity problem. Correlation coefficients of items for the three constructs are shown in Table 6-6, Table 6-7 and Table 6-8.

Colinearity diagnostics can also be determined by noting tolerance values (1-squared multiple correlation) and variance inflation factors (VIF). Low-tolerance values (those approaching zero) indicate that multiple correlation with other variables is high, suggesting the possibility of multicolinearity. The results of the analysis indicate that the tolerance values for all items range from 0.343 to 0.572, with the majority being above 0.45, to confirm the assumption has not been violated. The other value given is VIF, which is just the inverse of the tolerance value. VIF values above 10 would be a concern, indicating multicolinearity. VIF values for this analysis are between 2.94 and 3.74, indicating no possibility of multicolinearity.

Table 6-6: Correlation Matrix for Partner's Characteristics Capability (PCC)

	PO1	PO2	PO3	PO4	PO5	RC1	RC2	RC3	RC4	RC5	RC6	RC7
PO1	1											
PO2	.705	1										
PO3	.420	.445	1									
PO4	.504	.505	.425	1								
PO5	.374	.434	.388	.360	1							
RC1	.371	.460	.324	.318	.345	1						
RC2	.405	.480	.373	.354	.214	.543	1					
RC3	.337	.470	.353	.270	.430	.600	.527	1				
RC4	.241	.329	.339	.297	.376	.510	.448	.544	1			
RC5	.435	.481	.458	.323	.400	.519	.531	.471	.457	1		
RC6	.282	.419	.258	.314	.374	.507	.426	.539	.578	.476	1	
RC7	.295	.346	.383	.294	.485	.465	.420	.506	.503	.490	.567	1

Table 6-7: Correlation Matrix for Alliance Management Capability (AMC)

	CO1	CO2	CO3	CO4	CO5	CM1	CM2	CM3	CM4	CM5
CO1	1									
CO2	.506	1								
CO3	.438	.466	1							
CO4	.316	.352	.502	1						
CO5	.303	.398	.549	.517	1					
CM1	.228	.355	.386	.350	.480	1				
CM2	.256	.338	.339	.347	.353	.487	1			
CM3	.423	.406	.506	.429	.472	.493	.426	1		
CM4	.264	.328	.382	.400	.437	.513	.358	.539	1	
CM5	.225	.314	.335	.246	.313	.257	.439	.222	.253	1

Table 6-8: Correlation Matrix for Process Capability (PC)

	IT1	IT2	IT3	IT4	IT5	IN1	IN2	IN3	IN4	IN5	FP1	FP2	FP3	FP4
IT1	1													
IT2	.440	1												
IT3	.328	.366	1											
IT4	.324	.391	.513	1										
IT5	.389	.380	.386	.633	1									
IN1	.334	.297	.465	.244	.166	1								
IN2	.254	.206	.561	.335	.242	.654	1							
IN3	.255	.307	.290	.452	.359	.233	.269	1						
IN4	.189	.343	.208	.322	.339	.213	.217	.477	1					
IN5	.230	.373	.327	.414	.341	.296	.247	.543	.467	1				
FP1	.241	.320	.366	.330	.302	.410	.427	.196	.252	.222	1			
FP2	.297	.381	.201	.277	.351	.263	.159	.191	.377	.245	.405	1		
FP3	.290	.423	.205	.382	.428	.249	.226	.429	.541	.419	.363	.459	1	
FP4	.233	.306	.247	.390	.410	.226	.298	.444	.517	.489	.269	.348	.496	1

6.3.6 Assessment of Common Method Variance (CMV)

Surveys have important strengths that are quite appealing, such as the ability to efficiently obtain large samples and to generalise findings across multiple populations. Yet, surveys are also prone to certain problems, such as common method variance, which may lead to erroneous conclusions about relationships between variables by inflating or deflating findings. Common method variance (CMV) is the amount of spurious correlation between variables that is created by using the same method, often a survey to measure each variable (Craighead et al., 2011).

In this study, CMV is assessed using the "Harman single-factor test" with the aim to identify and measure variables that reflect the observed constructs. The Harman single-factor test requires loading all the measures in the study into an exploratory factor analysis, with the assumption that the presence of CMV is indicated by the emergence of either a single factor or a general factor, accounting for the majority of covariance among measures (Podsakoff et al., 2003).

All of the 36 variables were entered into an exploratory factor analysis, using principal components factor analysis, with no rotation. Referring to the extraction sums of squared loadings, the results explain 36.76% of variance is attributed to the measured items. The basic assumption of this test is that a substantial amount of common method variance exists if a general factor accounts for the majority of the covariance in the independent and criterion variables (Podsakoff & Organ, 1986). Therefore, the results revealed no possibility of CMV problem in the data.

6.4 CONFIRMATORY FACTOR ANALYSIS

Drawing on the procedures discussed in Chapter 6, this section validates the constructs through the use of one-factor and multi-factor congeneric models technique. This technique is used to measure the model fit for the uni-dimensionality, and to assess the convergent validity for analysing the correlation between measures (or items) for each construct of interest, as recommended by Heidt (2008). The following sections show the validity of each measurement construct of interest.

6.4.1 One-factor Congeneric Models Analysis

This section of the study focuses on all key findings in relation to initial measurement model fit along with confirmatory factor analysis (CFA). CFA tests the viability of a priori structures based on theory, previous experience, or research. It also examines whether data are consistent with highly constrained structures to meet conditions of model identification (Byrne, 2001).

As its power, CFA incorporates the testing of uni-dimensionality, and evaluates a data set by confirming the underlying structure on the basis of theoretical background (Mueller, 1996). This further suggests simplification, modification, and/or any required refinement in the measurement model for theory confirming and examining the level of fitness. Although model identification is the requirement of CFA, modification and standardised loading (standardised regression weights) in AMOS output are the options to verify the dimensionality of the measurement, or to verify the model fitness.

Modification indices (MI) comprise of variances, covariance, and regression weights. These indices are examined during evaluation of model fit to get the direction of modification, for example, whether freeing or incorporating parameters either between or among unobserved variables if required for obtaining better model fit. Anderson and Gerbing (1988) suggested that under unacceptable but converged and proper solutions, relating or deleting the indicator from the model are the preferred basic ways to re-specify the model. This means that item deletion and adding a new path indicator are the best ways to get a better-fitting model. Any changes or deletion of items in this iterative process results in changes in the parameters and model-fit statistics.

The measurement model is initiated with the examination of measurement properties of latent variables for one-factor congeneric models. A one-factor congeneric measurement model is the simplest form of a measurement model, and represents the regression of a set of observed indicator variables on a single latent variable. Two types of measurement models were assessed: one-factor congeneric models and multi-factor models. The former is employed to assess item reliability, determine scale reliability, and verify uni-dimensionality (Anderson & Gerbing, 1988).

One-factor congeneric measurement models are estimated to examine measurement properties of latent variables, within which a single latent variable (factor) is evaluated by a number of observed variables (items). Such models give a realistic interpretation of data by considering the varying degrees to which each item contributes to the overall measure to obtain a quasi-test of validity (Holmes-Smith & Rowe, 1994). Schumacker and Lomax (2008) suggested a minimum of three items to fit a congeneric model and compute a latent construct. Four to five items per factor are recommended for models to be over-identified (Kline, 2005). When a standard CFA model with a single factor possesses at least three indicators, or two factors, with two indicators per factor, a model is identified (Kline, 2005). Factors representing only two indicators are considered as unidentified. The findings on one-factor congeneric models are discussed below, followed by multi-factor models in Section 6.4.2.

In this study, ten one-factor congeneric measurement models are investigated. Nine models are over-identified, with each factor comprised of between four to seven items. The exception is the supply chain financial performance (SCFP) model, which is just identified with three items.

Two types of models are incorporated in this study; over-identified and just identified models. Table 6-9 to Table 6-14 show standardised coefficient and t-values for each-factor congeneric measurement model. Each scale is examined for possible redundant items, so that only those which best measure the construct under consideration are retained. Analyses indicated that modification is needed for models to be statistically fit with the data. For example, the modification indices indicate a covariance between items SCAP 3 and SCAP4 in model SCAP (Table 6-12) resulted in adequate data fitness. Further analysis was undertaken to ensure the data was fit for the final model, as described in Section 6.4.2.

Table 6-9: Standardized Coefficients for t-values for PCC

One-factor Congeneric Models for Partner Characteristics Capability (PCC)			
Items for Partner Compatibility		**Standardized Coefficients**	**t-value**
PO1	Our organization's values and norms are similar to our partner	0.81	7.89
PO2	Our goals and objectives are compatible to our partner	0.84	7.97
PO3	Our organization and our partner have common views on most business matters	0.56	6.50
PO4	The operating systems and tool of our organization are compatible with our partner	0.63	6.99
PO5	Our organization and our partner have compatible organizational cultures	0.52	scaling
Items for Resources Complementarities		**Standardized Coefficients**	**t-value**
RC1	Our partner's knowledge of customers complemented our resources and capabilities	0.74	10.44
RC2	Our partner's channels of distribution compensated our organization's resources and capabilities	0.67	9.56
RC3	Our partner's links with major buyers complemented our organization's resources and capabilities	0.76	10.61
RC4	Our partner's knowledge of technology management compensated our organization's resources and capabilities	0.71	10.10
RC5	Our partner's industry knowledge compensated our organization's resources and capabilities	0.68	9.65
RC6	Our partner's experience in related technologies compensated our organization's resources and capabilities	0.73	10.25
RC7	Our partner's availability of systems and tools compensated our organization's resources and capabilities	0.69	scaling

* Note: Scaling denotes standardized factor loadings value of indicator set to 1 to enable latent factor identification

Table 6-10: Standardized Coefficients and t-values for AMC

One-factor Congeneric Models for Alliance Management Capability			
Items for Cooperation		**Standardized Coefficients**	**t-value**
CO1	Our organization willingly provides accurate strategic information to our partner	0.50	6.79
CO2	Our organization provides technical information to our partner if needed	0.57	7.68
CO3	Our organization shares operational information with our partner	0.78	9.63
CO4	Our organization always look for new ways to do business with our partner	0.66	8.81
CO5	Our organization makes strategic decisions in consultation with our alliance partner	0.71	scaling
Items for Conflict Management		**Standardized Coefficients**	**t-value**
CM1	Our organization and partner have developed explicit mechanism to resolve conflict(s)	0.73	4.63
CM2	Our organization and partner resolve conflict(s) through close interaction with each other	0.59	4.66
CM3	Our organization and partner undertake joint problem solving to avoid conflict	0.71	5.18
CM4	Our organization encourages employees to be culturally sensitive while resolving conflict	0.70	4.64
CM5	Our organization involves top management to resolve conflicts if needed	0.34	scaling

* Note: Scaling denotes standardized factor loadings value of indicator set to 1 to enable latent factor identification

Table 6-11: Standardized Coefficients and t-values for PC

One-factor Congeneric Models for Process Capability			
Items for Information Technology		**Standardized Coefficients**	**t-value**
IT1	Our organization uses information technology enabled transaction processing to coordinate supply chain activities	0.53	6.47
IT2	Our organization has capable employees to use information technology enabled transaction processing	0.49	7.03
IT3	Our organization shares sensitive information with our partner	0.59	8.61
IT4	Exchange of information between our organization and partner takes place frequently, informally in a timely manner	0.86	9.86
IT5	Our organization and partner keep each other informed about changes that may affect us	0.73	scaling
Items for Innovation		**Standardized Coefficients**	**t-value**
IN1	Our organization involves our partner in the product design and development stage	0.35	4.76
IN2	Our partner has major influence on the design of our new products	0.35	4.69
IN3	Our organization emphasizes on constant innovation as part of our corporate culture	0.74	8.33
IN4	Our organization has the capacity to jointly develop new product and processing technologies to satisfy future needs	0.64	7.98
IN5	It is our organization's policy to constantly develop innovative capacity in order to compete in the global market	0.74	scaling
Items for Flexibility Proficiency		**Standardized Coefficients**	**t-value**
FP1	Our partner is capable of responding to our changing needs and requirement	0.51	6.10
FP2	Our organization is able to adjust production volume to meet unexpected demand	0.63	6.97
FP3	Our organization and partner are able to produce a range of products for different types of customers	0.76	7.24
FP4	Our organization and partner increase the number of new products introduces each year to cope with new market competition	0.61	scaling

* Note: Scaling denotes standardized factor loadings value of indicator set to 1 to enable latent factor identification

Table 6-12: Standardized Coefficients and t-values for SCAP

One-factor Congeneric Models for Supply Chain Agility Practices (SCAP)			
Items for Supply Chain Agility Practices		**Standardized Coefficients**	**t-value**
SCAP1	The alliance enables our organization's capacity to increase frequencies of new product introductions	0.85	4.60
SCAP2	The alliance enables our organization's ability to increase levels of product customization	0.73	4.68
SCAP3	The alliance enables our organization's manufacturing technologies to reduce manufacturing lead time	0.60	5.26
SCAP4	The alliance enables our organization to act promptly on changes in customer requirement	0.33	scaling

* Note: Scaling denotes standardized factor loadings value of indicator set to 1 to enable latent factor identification

Table 6-13: Standardized Coefficients and t-values for SCOP

One-factor Congeneric Models for Operational Performance (SCOP)			
Items for Supply Chain Operational Performance		**Standardized Coefficients**	**t-value**
SCOP1	This alliance has improved our organization delivery performance	0.67	10.75
SCOP2	This alliance has improved our order cycle times	0.67	10.91
SCOP3	This alliance has increased our forecast accuracy	0.81	13.15
SCOP4	This alliance has improved our order processing accuracy	0.85	scaling

* Note: Scaling denotes standardized factor loadings value of indicator set to 1 to enable latent factor identification

Table 6-14: Standardized Coefficients and t-values for SCFP

One-factor Congeneric Models for Supply Chain Financial Performance (SCFP)			
Items for Supply Chain Financial Performance		**Standardized Coefficients**	**t-value**
SCFP1	Our organization is satisfied with this alliance in terms of profitability	0.90	23.77
SCFP2	Our organization is satisfied with this alliance in terms of market share	0.84	20.23
SCFP3	Our organization is satisfied with this alliance in terms of sales growth	0.95	scaling

* Note: Scaling denotes standardized factor loadings value of indicator set to 1 to enable latent factor identification

Next, Table 6-15 shows all items that are linked to each one-factor congeneric measurement model and goodness-of-fit statistics. There are ten one-factor congeneric models in this study. As demonstrated by goodness-of-fit statistics, adequacy of the three models; flexibility proficiency, supply chain agility practices; and supply chain financial performance were not met with explicitly CMIN> 3.0. The remaining seven one-factor models fitted the data well (range of statistics: CMIN 0.78-2.83; RMSEA 0.000-0.09; CFI 0.98-1.00; NNFI 0.95-1.00; AGFI 0.93-0.98; GFI 0.97-0.99).

Table 6-15: Items and Goodness-of-Fit Statistics for Ten One-Congeneric Measurement Models

Sub-Factors	Items	CMIN	RMSEA	CFI	NNFI	AGFI	GFI
Partner Compatibility	PO1,2,3,4,5	2.83	0.09	0.98	0.95	0.93	0.98
Resources Complementarities	RC1,2,3,4,5,6,7	2.10	0.07	0.98	0.97	0.93	0.97
Cooperation	CO1,2,3,4,5	1.60	0.05	0.99	0.98	0.96	0.99
Conflict Management	CM1,2,3,45	2.19	0.07	0.99	0.96	0.95	0.99
Information Technology	IT1,2,3,4,5	2.20	0.07	0.99	0.96	0.95	0.99
Innovation	IN1,2,3,4,5	0.78	0.00	1.00	1.00	0.98	0.99
Flexibility Proficiency	FP1,2,3,4	3.57	0.10	0.97	0.92	0.93	0.99
Supply Chain Agility Practices	SCAP1,2,3,4	3.54	0.10	0.99	0.94	0.93	0.99
Supply Chain Operational Performance	SCOP1,2,3,4	2.80	0.09	0.99	0.97	0.95	0.99
Supply Chain Financial Performance	SCFP1,2,3	67.48	0.52	0.81	0.42	0.13	0.87

6.4.2 CFA Multi-Factor Analysis

Following one-factor congeneric models is the multi-factor measurement model analysis. This analysis was undertaken to test for the multi-dimensionality of each theoretical construct. Multi-factor measurement models are also used to examine scale reliability (Cronbach's Alpha), internal consistency (construct reliability), distinct validity (variance extracted), calculate weighted composite scores, test for convergent and discriminant validity. This is explained in the following sections. Figure 6-4 to Figure 6-7 show four multi-factor measurement models and goodness of fit statistics associated with each final model. The overall results of the final supply chain relationships (SCR) model are reported in Section 6.5.5.

6.5 VALIDATING MEASUREMENT MODELS

This section discusses the measurement models for each construct of supply chain relationships; partner characteristics capability (PCC), alliance management capability (AMC), process capability (PC) and the final supply chain relationship (SCR) measurement models.

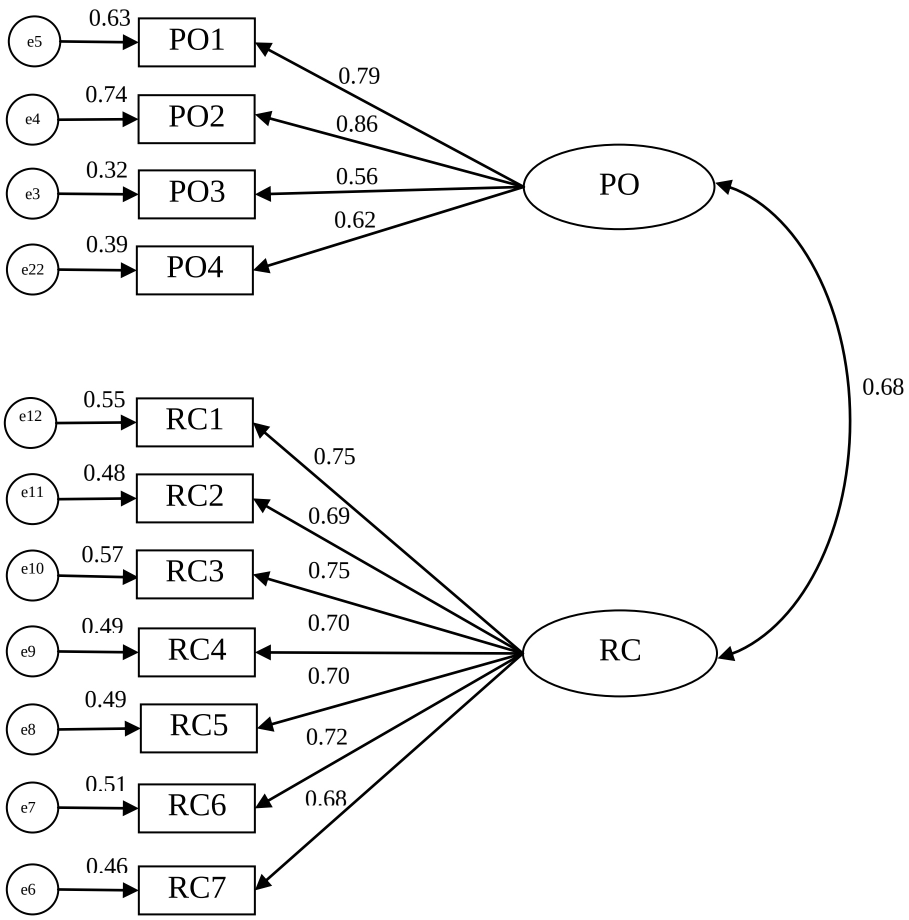
6.5.1 Measurement Model of the Partners Characteristics Capability (PCC)

The measurement model of the partners' characteristics capability (PCC) obtained from the CFA procedure is presented in Figure 6.4. AMOS version 18 is used to produce the measurement model of PCC. Theoretically, PCC comprises of two sub-factors (partner compatibility and resources complementarities) with five indicators reflected partners compatibility (PO1 to PO5) and seven indicators reflected resources complementarities (RC1 to RC7). These twelve original indicators are examined for factor structure. The final PCC measurement model comprises eleven items which fit the data well, displayed in Figure 6-4. These indicators are subjected to CFA and the results associated with goodness-of-fitn statistics are provided in Table 6-16. To fully confirm the convergent validity, model fit indices, AVE and composite reliability are calculated. The procedure formulated by Fornell and Larcker (1981) is used to calculate AVE.

Initial inspection of the inter-item correlation matrix revealed that item PO5 is poorly correlated with all other items in the scale. Examination of the loadings indicates that the standardised regression weight for PO5 is low (0.56). This item asked whether the respondents and partners have compatible organisational culture, which is slightly different from other items in the scale. While other partner compatibility items encapsulated partner compatibility on the organisation's values and norms, goals and objectives and operating procedures, item PO5 strived to know the organisation's culture.

Even though all loadings for PO and RC are above 0.50, which indicate high levels of convergence, the model fit indices for RMSEA is above 0.08. The result is an acceptable fit of measurement model. Item PO5 exhibits an acceptable loading of 0.56 (relatively low compared to other items), but modification indices (MI) identified a significant error covariance associated with this item. MI with expected changes in statistics associated with the error covariance reveals misspecification between PO5 and RC7.

Looking further at the standardised regression weight between PO5 and RC7 has shown that PO5 has the lowest estimate score of 0.56. Although PO5 is important to measure the overall partner compatibility, and shows relatively reasonable standardised loading, it affects dimensionality of the construct and deletion is the option to improve the overall measurement fitness model. By removing this item, all fit indices show significant improvement, which demonstrates high loading with reduced χ^2 value from 148.24 (df=53, p=0.000) to 98.09 (df=43, p=0.000). Although this marginally affects the overall fit statistics, the suggested modification has a tremendous impact on the overall measurement model. RMSEA value decreases from 0.09 to 0.07, CFI, NNFI, and GFI are above 0.90, whereas AGFI is above 0.80 (see Table 6.16).



Note: All coefficients are significant at $p < 0.001$

Figure 6-4: A CFA First-Order Measurement Model of Partner's Characteristics Capability (PCC)

Table 6-16: CFA Findings of Partner's Characteristics Capability (PCC) Model

Item	Initial Standardized Loadings	Final Standardized Loadings	Internal Consistency Cronbach's alpha
PO1	0.78	0.79	0.81
PO2	0.84	0.86	
PO3	0.56	0.56	
PO4	0.63	0.62	
PO5	0.52	deleted	
RC1	0.74	0.75	0.88
RC2	0.67	0.69	
RC3	0.76	0.75	
RC4	0.70	0.70	
RC5	0.68	0.70	
RC6	0.72	0.72	
RC7	0.68	0.68	

Achieved Fit Indices

	CMIN (χ^2/df)	RMSEA	CFI	NNFI	AGFI	GFI
Initial	2.80	0.09	0.93	0.91	0.86	0.90
Final	2.28 (98.09/43)	0.07	0.95	0.94	0.89	0.93

	AVE	Composite Reliability (CR)
PO	0.52	0.81
RC	0.51	0.88

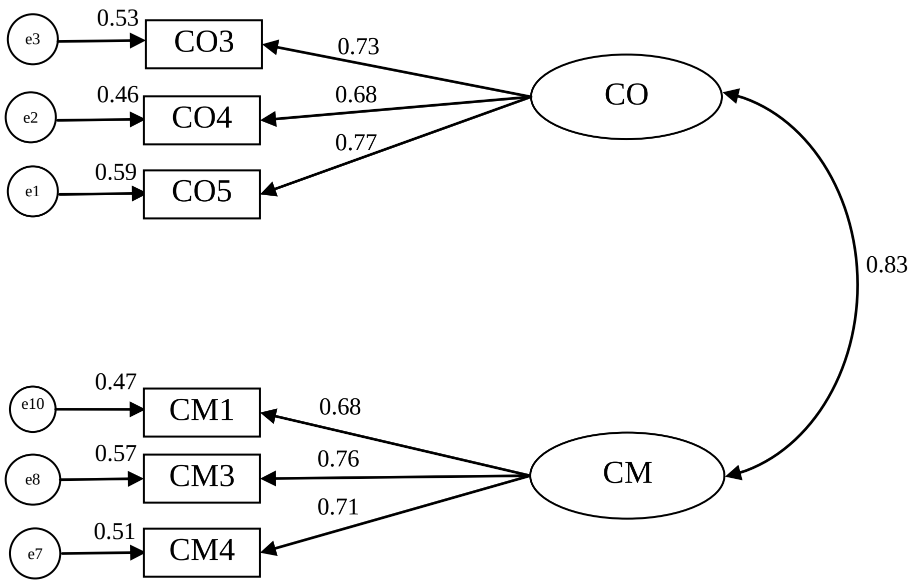
The results reflect good model fit, according to parameters suggested in Table 5-2 (see section 5.3.9). AVE and CR results for both sub-factors are above 0.5 and 0.70 respectively, confirming the convergent validity for PCC model. These results indicate that the retained four items of partner compatibility (PO) and seven items of resource complementarities (RC) are considered reliable as well as valid for the construct measure.

6.5.2 Measurement Model of the Alliance Management Capability (AMC)

Alliance management capability is measured using two different sub-factors: cooperation (CO) and conflict management (CM). CO is measured by five items labelled as CO1, CO2, CO3, CO4 and CO5. Conflict management is measured by five items named as CM1, CM2, CM3, CM4 and CM5. Figure 6-5 presents the final AMC model obtained from the CFA procedure, which comprises six items. The measurement model shows adequate fitness for the data.

Given that these two sub-factors are considered as exogenous variables, the statistical SEM model specifies that they are inter-correlated. Although standardised parameter estimates are all significant ($p < 0.001$), the results of the CFA indicate that the initial measurement model needed to be re-specified. The chi-square is significant (χ^2=91.44, df= 34, p= 0.000, N=252). The G.F.I. is 0.93, AGFI= 0.89, N.N.F.I.= 0.91, C.F.I.=0.93, RMSEA=0.08 and CMIN=1.25. Furthermore, CFA results indicate that the inter-correlation among cooperation (CO) and conflict-management (CM) sub-factors are 0.83, demonstrating good discriminant validity. However, calculated AVE for the initial measurement model was below 0.5, indicating a lack of convergent validity. Given that reason, items with a loading of less than 0.63 were deleted to retain a high-quality data set suggested by Tabachnick and Fidell (2001).

After iteratively removing items CO1, CO2, CM2 and CM5, CFA was performed again with the remaining six items. As goodness of fit indices are improved, the modified model shows an improved fit to the data with CMIN=1.25, RMSEA=0.03, CFI=0.99, NNFI=0.99, AGFI=0.97, GFI=0.99, and χ^2 reduced from 91.44 to 9.98. The new calculated AVE is above 0.52, demonstrating a good convergent validity and confirming that more than 50% of the variance of AMC is due to its indicators. The composite construct reliability for the three items of CO is 0.77 and three items of CM is 0.76, which are well above the acceptable level indicated in the literature (Hair et al., 2010). This indicates that the retained six items are considered reliable as well as valid for this construct measure. Table 6-17 exhibits the summary of findings on AMC model.



Note: All coefficients are significant at $p < 0.001$

Figure 6-5: A CFA First-Order Measurement Model of the Alliance Management Capability (AMC)

Table 6-17: CFA Findings of Alliance Management Capability (AMC) Model

<table>
<tr><th>Item</th><th colspan="2">Initial Standardized Loadings</th><th colspan="2">Final Standardized Loadings</th><th colspan="2">Internal Consistency Cronbach’s alpha (α)</th></tr>
<tr><td>CO1</td><td colspan="2">0.55</td><td colspan="2">deleted</td><td colspan="2" rowspan="5">0.79</td></tr>
<tr><td>CO2</td><td colspan="2">0.62</td><td colspan="2">deleted</td></tr>
<tr><td>CO3</td><td colspan="2">0.75</td><td colspan="2">0.73</td></tr>
<tr><td>CO4</td><td colspan="2">0.66</td><td colspan="2">0.68</td></tr>
<tr><td>CO5</td><td colspan="2">0.72</td><td colspan="2">0.77</td></tr>
<tr><td>CM1</td><td colspan="2">0.69</td><td colspan="2">0.68</td><td colspan="2" rowspan="5">0.77</td></tr>
<tr><td>CM2</td><td colspan="2">0.61</td><td colspan="2">deleted</td></tr>
<tr><td>CM3</td><td colspan="2">0.74</td><td colspan="2">0.76</td></tr>
<tr><td>CM4</td><td colspan="2">0.68</td><td colspan="2">0.71</td></tr>
<tr><td>CM5</td><td colspan="2">0.44</td><td colspan="2">deleted</td></tr>
<tr><th colspan="7">Achieved Fit Indices</th></tr>
<tr><th></th><th>CMIN (χ^2/df)</th><th>RMSEA</th><th>CFI</th><th>NNFI</th><th>AGFI</th><th>GFI</th></tr>
<tr><th>Initial</th><td>2.69</td><td>0.08</td><td>0.93</td><td>0.91</td><td>0.89</td><td>0.93</td></tr>
<tr><th>Final</th><td>1.25 (9.98/8)</td><td>0.03</td><td>0.99</td><td>0.99</td><td>0.97</td><td>0.99</td></tr>
<tr><th colspan="2"></th><th colspan="3">AVE</th><th colspan="2">Composite Reliability (CR)</th></tr>
<tr><th colspan="2">CO</th><td colspan="3">0.52</td><td colspan="2">0.77</td></tr>
<tr><th colspan="2">CM</th><td colspan="3">0.51</td><td colspan="2">0.76</td></tr>
</table>

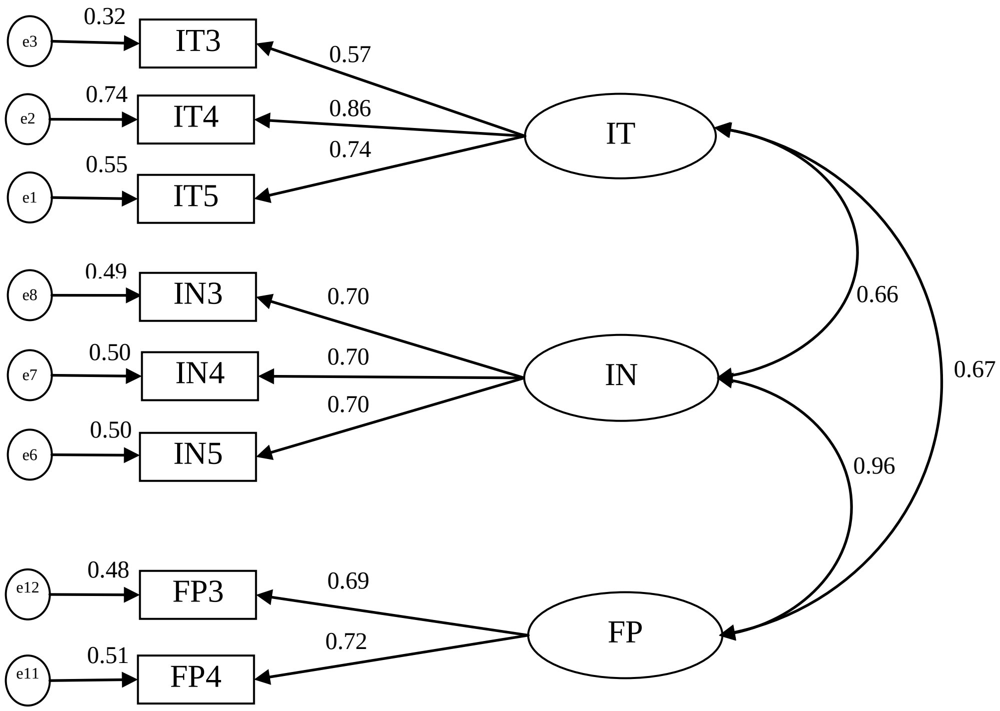
The results reflect good model fit according to parameters suggested in Table 5-2 (see section 5.3.9). AVE and CR results for both sub-factors are above 0.5 and 0.70 respectively, confirming the convergent validity for AMC model. This indicates that the retained three items of CO and three items of CM are considered reliable as well as valid for the construct measure.

6.5.3 Measurement Model of the Process Capability (PC)

Process capability is considered as a reflective construct, as it is reflected by three sub-factors; information technology (IT), innovation (IN) and flexibility proficiency (FP). In total, fourteen items represent the three constructs of process capability, subject to CFA analysis. Each composite variable represents the independent dimensions of information technology, innovation and flexibility proficiency. IT is measured using five items (IT1 to IT5), innovation is measured using five items (IN1 to IN5), and flexibility proficiency is measured using four items (FP1 to FP4). As Figure 6-6 and goodness-of-fit statistics show, the final P.C. measurement model comprises of eight items and fits the data well.

The analysis is conducted with process capability being measured as a second-order construct. The CFA analysis shows that the inter-correlations for the composite variables among the items of the three sub-factors of information technology, innovation and flexibility proficiency are low (< 0.85) and significant at $p < 0.01$. The results of the initial CFA PCC model of the fourteen items indicates that the model poorly fit to the data, with high χ^2 value of 362.16 (df=74, p=0.000), unacceptable CMIN, RMSEA, CFI, NNFI, AGFI and GFI scores. Items with standardised parameters estimate below 0.60 are removed iteratively. As a result, upon deleting of items IT1, IT2, IN1, IN2, FP1 and FP2, the better fitted model is identified with reduced χ^2 value from 362.16 to 33.89 (df=17 and p=0.009) and all other fit indices show significant improvement to the overall fit to the model.

The findings of the final measurement model comprise eight items are fitted to the model without any further investigation of the covariance structure in the modification indices of this construct. The new calculated AVE is 0.50 and above, demonstrating a good convergent validity, and confirming that at least 50% of the variance of PC is due to its indicators. The composite construct reliability for the three items of IT is 0.77, three items of IN is 0.75, and two items of FP is 0.66 which are well above the acceptable level as indicated in the literature (Hair et al., 2010). This indicates that the retained eight items are considered reliable as well as valid for this construct measure. Table 6-18 summarised the CFA results for PC model.



Note: All coefficients are significant at $p < 0.001$

Figure 6-6: A CFA First-Order Measurement Model of the Process Capability (PC)

Table 6-18: CFA Findings of Process Capability (PC) Model

Item	Initial Standardized Loadings	Final Standardized Loadings	Internal Consistency Cronbach's alpha (α)
IT1	0.52	deleted	
IT2	0.59	deleted	
IT3	0.61	0.57	0.77
IT4	0.77	0.86	
IT5	0.73	0.74	
IN1	0.48	deleted	
IN2	0.49	deleted	
IN3	0.66	0.70	0.73
IN4	0.67	0.70	
IN5	0.68	0.70	
FP1	0.52	deleted	
FP2	0.56	deleted	0.72
FP3	0.73	0.69	
FP4	0.68	0.72	

Achieved Fit Indices

	CMIN (χ^2/df)	RMSEA	CFI	NNFI	AGFI	GFI
Initial	4.89	0.13	0.78	0.73	0.72	0.81
Final	1.99 (33.89/7)	0.06	0.98	0.96	0.92	0.96

	AVE	Composite Reliability (CR)
IT	0.54	0.77
IN	0.50	0.75
FP	0.50	0.66

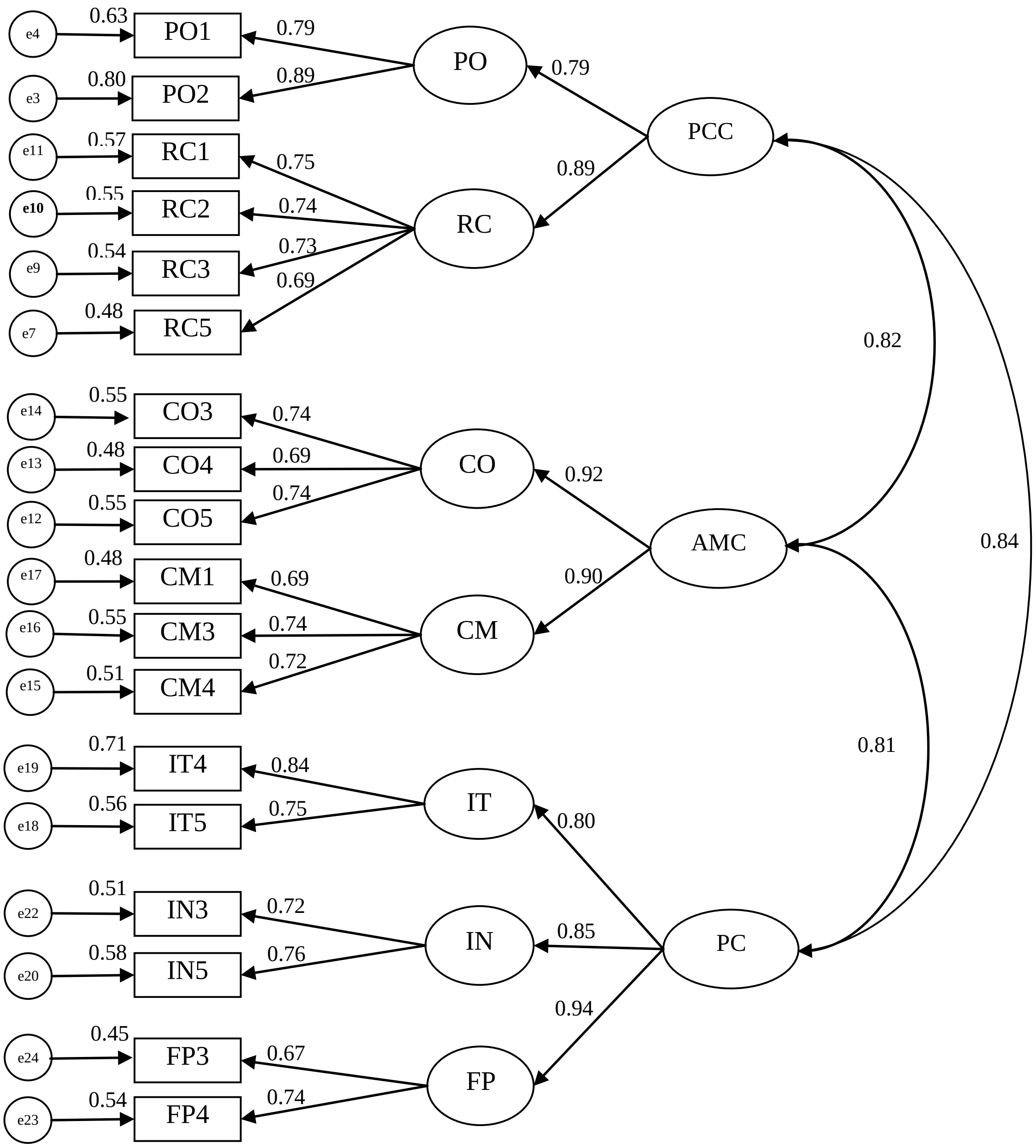
6.5.4 Measurement Model of the Supply Chain Relationships (SCR)

Multi-factor model analysis was also undertaken on the three constructs of supply chain relationship (SCR). Theoretically, PCC, AMC and PC discussed earlier are the reflective constructs of SCR. The measurement model of SCR is analysed using three proposed constructs (PCC, AMC, and PC). The final models of PCC, AMC and PC are considered in this analysis, with two sub-factors of PCC, two sub-factors of AMC and three sub-factors of PC. In total, twenty five items represented the three finalised models of PCC, AMC and PC was subjected to a CFA.

The initial standardised estimations for the hypothesised model show that all the parameters are significant ($p < 0.001$). However the initial model indices indicate that this measurement model does not adequately fit the data. The chi-square is (χ^2=616.13, df=265, p=0.000, N=252). The GFI is 0.837, AGFI is 0.800, NNFI=0.867, CFI=0.882, RMSEA=0.073 and CMIN=2.325. CFA results also indicate that the inter-correlations (PCC and AMC; PCC and PC) are higher than 0.85, demonstrating that the proposed items do measure one factor or two.

Because most of the goodness-of-fit indices are not within recommended level (i.e., GFI, AGFI, NNFI, and CFI), and the factors do not provide discriminant validity, further detailed assessment is performed to develop a better fit and more parsimonious model. The assessment involved inspection of normalised residual and modification indices. By doing this, it was found that all the values are within an acceptable level. Therefore items with factor loading less than 0.63 are removed iteratively, until the most representative model that fits the data is achieved. This procedure resulted in removing seven items for further analysis. These items are PO3, PO4, RC4, RC6, RC7, IT3 and IN4. However the deletion does not change the content of supply chain relationship. The remaining items of the partners' characteristics capability, alliance management capability and process capability constructs still capture this dimension because they include important measures of supply chain relationships.

Accordingly, the modified measurement model is found to fit the data adequately. The chi-square is (χ^2=224.03, df=125, p=0.000, N=252). The GFI is 0.913, AGFI=0.880, NNFI=0.939, CFI=0.950, RMSEA=0.056 and CMIN=1.792. Given that the model fit the data adequately and the correlations between underlying constructs were less than 0.85, no further adjustments ware required. As presented in Figure 6-7, the modified model is represented with eighteen items, with standardised factor loadings all high (above 0.65). This indicates that standardised factor loadings for these measures are deemed to be statistically significant ($p < 0.001$), providing uni-dimensional scales for each of the three constructs of SCR.



Note: All coefficients are significant at p < 0.001

Figure 6-7: A CFA First-Order Measurement Model of the Supply Chain Relationship (SCR)

6.5.5 Results of Scale Reliability, Convergent and Discriminant Validity

Following the establishment of the unidimensionality step, and before testing the hypothesis in the structural model (stage 2), the reliability and validity of the underlying constructs were assessed (De Wulf et al., 2001). For this purpose, the constructs discussed in Section 6.4 are assessed for reliability using Cronbach's Alpha, average variance extracted (AVE), construct reliability (CR) and discriminant validity.

Scale reliability of the measures in this study is first assessed using Cronbach's (1951) coefficient alpha, and then using confirmatory factor analysis (CFA). Instrument reliability refers to the internal consistency of items that comprise a latent construct (Hair et al., 2010). Cronbach's Alpha can be regarded as a lower-bound estimate of internal reliability. As for Cronbach's coefficient alpha, Table 6.19 shows that all the sub-constructs of supply chain relationships exceed the suggested level of 0.70 (Nunnaly, 1978).

In using confirmatory factor analysis, construct/composite reliability (CR) and variance extraction (AVE) measures are also used to estimate scale or construct reliability. AVE and CR are calculated from the model estimates, using formulae given by Fornell and Larcker (1981). Bagozzi and Yi (1988) recommended that AVE should be equal to or greater than 0.50, and C.R. should be equal to or greater than 0.60.

The formulae are as follows:

$$\text{AVE} \qquad \rho_{vc(\eta)} = \frac{\sum \lambda_i^2}{\sum \lambda_i^2 + \sum \varepsilon_i}$$

$$\text{CR} \qquad \rho_{\eta} = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + \sum \varepsilon_i}$$

Where λ_i is the standardised loading for each observed variable, ε_i is the error variance associated with each observed variable, and ρ_η is the measure of construct reliability

Based on these assessments, measures used within this study are within the acceptable levels, supporting the reliability of the constructs. In the case of validity, confirmatory factor analysis (CFA) has also been used to assess construct, convergent and discriminant validity (see Section 5.3.7). Empirically, construct validity exists when the measure is a good representation of the variable the researcher intends to measure. As Bagozzi (1980) argued, construct validity is a necessary prerequisite for theory-testing. In this thesis, results obtained from goodness-of-fit indices confirmed construct validity (Hsieh & Hiang, 2004).

Multi-factor analyses enable researchers to address issues of convergent and discriminant validity (Gerbing & Anderson, 1988). Convergent validity is reflected in the magnitude latent construct of statistically significant factor loadings. These loadings provide investigators with information about the extent to which a given observed variable is able to measure a latent construct. Garver and Mentzer (1999) posited that "a reasonable benchmark value of substantial magnitude of the parameter estimate indicating convergent validity is 0.70." However, measurement scales also attain convergent validity when standardised factor loadings of each item and all t-values are higher than the significant level (>1.96) As for convergent validity, evidence has been found in which all factor loadings for items measuring the same construct are statistically significant (Anderson & Gerbing, 1988; Holmes-Smith et al., 2004).

Table 6-19 summarises findings on all constructs and sub-factors of supply chain relationship measurement models. All the seven sub-factors are found to have high loading factors (greater than 0.50) and are statistically significant ($p < 0.001$). The results of AVE and CR provide additional support for convergent validity and internal consistency. AVE values range from 0.71 to 0.83 and C.R. values from 0.83 to 0.91, indicating high internal consistency and confirming the convergent validity respectively. Meanwhile, Table 6-20 displays standardised factor loading, t-values and factor score weights for each item in the finalised measurement model of supply chain relationships (SCR) model. The results show the high standardised factor loading (above 0.63), indicating that the data are good and support the model fit.

Table 6-19: CFA Findings of Supply Chain Relationship (SCR) Model

Construct	Sub-Factors	Standardized Factor Loading	Cronbach's Alpha (α)	AVE	CR
Partner's Characteristics Capability (PCC)	PO	0.791	0.851	0.71	0.83
	RC	0.892			
Alliance Management Capability(AMC)	CO	0.921	0.836	0.83	0.91
	CM	0.898			
Process Capability (PC)	IT	0.796	0.826	0.75	0.90
	IN	0.853			
	FP	0.935			

Table 6-20: Standardized Factor Loadings, t-values and Factor Score Weights for Three Constructs of Supply Chain Relationship (SCR) Measurement Model

Construct	Standardized Factor Loading	t-value	Factor Score Weights
Partner's Characteristics Capability			
PO1	0.791	12.046	0.275
PO2	0.892	scaling	0.516
RC1	0.754	scaling	0.185
RC2	0.740	11.124	0.173
RC3	0.734	11.037	0.153
RC5	0.692	10.390	0.139
Alliance Management Capability			
CO3	0.739	10.550	0.178
CO4	0.690	9.924	0.175
CO5	0.741	scaling	0.197
CM1	0.694	9.612	0.208
CM3	0.742	10.156	0.216
CM4	0.717	scaling	0.179
Process Capability			
IT4	0.843	10.448	0.371
IT5	0.751	scaling	0.222
IN3	0.716	9.341	0.225
IN5	0.759	scaling	0.281
FP3	0.673	9.213	0.189
FP4	0.736	scaling	0.225

Finally, discriminant validity of the latent constructs is verified by comparing the square root of the AVE and correlations for the latent constructs, as recommended by Fornell and Larcker (1981). The analysis results in Table 6-21 confirmed the discriminant validity, in which the square root of AVE for each construct is greater than the levels of correlations involving the latent constructs. The results of inter-construct correlations also show that each construct shares larger variance with its own measures than with other measures.

Table 6-21: Correlation between Constructs

Constructs	PCC	AMC	PC
PCC	0.843		
AMC	0.821	0.909	
PC	0.838	0.814	0.863

Notes: PCC : Partner's Characteristics Capability
AMC: Alliance Management capability
PC : Process Capability

*The shaded numbers in the diagonal row are square roots of the average variance extracted

6.5.6 Review of Measurement Model

Individual measurement model fit has been tested for all the independent and dependent variables in the proposed models. As shown earlier, each construct or latent variable in the first stage has its own measurement model, in which the observed variables (indicators or items) define each construct. Each measurement model examined in this thesis is assessed in two steps. Assessing the uni-dimensionality is first, followed with assessment of reliability and validity. These assessments are conducted using CFA.

In the first step, each measurement model is assessed as fully specified by determining the relationships between the factors and their items. Results indicate that the fully-specified measurement model needs to be respecified, in order to provide a more parsimonious model. The re-specification of the model is based on items not highly loaded on their respective hypothesised factor (through investigating significance of standardised parameter estimates), the model not adequate to fit the data (through goodness-of-fit indices), and a large number of residuals and modification indices. The resulting modified models are then assessed for acceptable fit to proceed with further analysis.

Further analyses were conducted to evaluate the multi-factor model, to examine scale reliability (Cronbach's Alpha), internal consistency (construct reliability), distinct validity (variance extracted), calculate weighted composite scores, and test for convergent and discriminant validity of the modified models. Internal consistency is assessed using Cronbach's Alpha, AVE and CR. As indicated in Table 6-16 to 6-18, these measures identified values above the recommended levels needed for this study (i.e., 0.70 for Cronbach's Alpha, 0.70 for C.R., and 0.50 for AVE), indicating acceptable levels for the reliability of constructs. In the case of validity, convergent validity is supported by all items being statistically significant ($p < 0.001$) and loading on their specified factors. Convergent validity was also supported by being AVE equal or more than 0.50.

The fit of the model using goodness-of-fit indices (as explained in section 5.3.9) has confirmed construct validity. Discriminant validity is analysed on the final SCR measurement model, combining all the latent constructs of supply chain relationships. It is achieved by deleting the items with low loading (<0.65). In this process, fifteen items have been excluded from the multi-factor analysis, to achieve a better fit to the data.

In this section, an overall measurement model test has been conducted to test the adequacy of the measurement model. It examines the covariance structures for all latent variables, and the overall measurement model (initial and final) is then tested. The fit statistics for initial items are presented in Column 1 of Table 6-22, which clearly indicates a weak fit to the data (Initial Model). The model fit statistics of the final overall measurement model test are displayed in Column 2 of Table 6-22.

Table 6-22: Summary of Overall (Initial and Final) Measurement Model of Supply Chain Relationship (SCR)

Fit Indices	**Overall Measurement Model**	
	Initial Model	**Final Model**
χ^2 (df)	1458.917 (573)	181.269 (114)
RMSEA	0.078	0.048
GFI	0.718	0.927
AGFI	0.672	0.891
CFI	0.798	0.966
NNFI	0.778	0.954
CMIN	2.546	1.590

In the final model, χ^2 value is reduced by 1277.648 (df459, p< 0.000) from 1458.917, along with improving other fit indices in the final overall measurement model. The application of suggested modifications in the individual measurement models also substantially improved the other fit indices in the overall measurement model. The remained items in different construct measures suggest reasonable congruity between data and the measurement model. It increases the level of fit with the total amount of change in CMIN (0.956), RMSEA (0.03), CFI (0.168), NNFI (0.176), AGFI (0.219 and GFI (0.209). Finally, it is evident that all items loaded satisfactorily on their respective factors, and that no cross-loading of items onto a different actor occurred. Thus, this further affirms that the items for each construct are convergent into their single-factor model, and that each latent variable is discriminated from the other in the overall model.

Following CFA, evaluation of the measurement models for uni-dimensionality, multi-factor, reliability, construct validity, convergent validity and discriminant validity, the data were ready for analysis. The next stage is to perform the analysis of the structural model, and present the main findings originating from path model analysis and test for hypothesised relationships.

6.6 STRUCTURAL EQUATION MODELLING (SEM)

Once all constructs in the measurement model are validated and satisfactory fitness achieved, a structural model can then be tested and presented as a second and main stage of the analysis (Anderson & Gerbing, 1988; Holmes-Smith et al., 2004; Kline, 2005; Hair et al., 2010). The structural model is the portion of the model that specifies how the latent variables are related to each other (Arbuckle, 2005). The structural model aims to specify which latent constructs directly or indirectly influence the values of other latent constructs in the model (Byrne, 2001).

The purpose of the structural model is therefore to test the underlying hypotheses in order to answer the research questions outlined in Chapter 1. As presented in Table 6-23, these hypotheses were represented in six causal paths (H1, H2, H3, H4, H5 and H6) to determine the relationships between the constructs under consideration. In the proposed theoretical model discussed in Chapter 3, the underlying constructs are classified into two classes, including exogenous constructs (PCC, AMC and PC) and endogenous constructs (SCAP, SCOP and SCFP).

Table 6-23: Underlying Hypotheses in the Thesis

Hypotheses No.	Hypotheses
H1 PCC $\longrightarrow$ SCAP	Partner's characteristics capability has a significant positive effect on supply chain agility practices
H2 AMC $\longrightarrow$ SCAP	Alliance management capability has a significant positive effect on supply chain agility practices
H3 PC $\longrightarrow$ SCAP	Process Capability has a significant positive effect on supply chain agility practices
H4 SCAP $\longrightarrow$ SCOP	Supply chain agility practices have a significant positive effect on supply chain operational performance
H5 SCAP $\longrightarrow$ SCFP	Supply chain agility practices have a significant positive effect on supply chain financial performance
H6 SCOP $\longrightarrow$ SCFP	Supply chain operational performance has a significant positive effect on supply chain financial performance

To evaluate the structural model, goodness-of-fit indices were examined to assess if the hypothesised structural models the data. If it does not, the requirement is to re-specify the model until one is achieved that exhibited both acceptable statistical fit and indicated a theoretically meaningful representation of the observed data (Anderson & Gerbing, 1988; Kline, 2005; Tabachnick & Fidell, 2007; Hair et al., 2010). Because the assumptions underlying structural equation modelling are met (see section 5.3.1), the coefficient parameter estimates are examined along with the overall model fit indices to test hypotheses H1 to H6.

Parameter estimates are fundamental to SEM analysis, because they are used to generate the estimated population covariance matrix for the model (Tabachnick & Fidell, 2007). Coefficients' values were obtained by dividing the variance estimated by its Standard Error (SE). That is, when the Critical Ratio (CR) called z-value in Table 6-24 (section

6.6.2) and Table 6-25 (section 6.6.3) is greater than 1.96 for a regression weight (or standardised estimates), the parameter is statistically significant at the 0.05 levels.

6.6.1 Path Analysis with Latent Variables

Path analysis is employed using maximum likelihood estimation method to test hypotheses. The main purpose of this analysis is to assess the extent to which a hypothesised model adequately describes sample data. The guidelines proposed by Byrne (2001) were employed to determine adequacy of a hypothesised model, and to detect any source of incorrect estimation in the model.

When a hypothesised model does not fit the data well, it is necessary to modify the model to attain a better fit vis-å-vis post-hoc model testing (Diamantopoulos & Siguaw, 2000). Model modifications comprise theory trimming (deletion of non-significant paths) and/or addition of new paths (Kline, 2005). Post-hoc analysis focuses on detecting and identifying the source of poor model fit in the originally hypothesised model, based on improvement information from AMOS 18.0 (modification indices). The value of a modification index represents the expected drop in overall χ^2values if the parameters are to be freely estimated. However, this can only be done when changes are meaningful, justifiable and driven by prior research (Schumacker & Lomax, 2004).

A re-specified model that demonstrates excellent fit with the data might not be applicable to other samples (Diamantopoulos & Siguaw, 2000). Kline (2005) cautioned that model re-specification should be consistent with theory, and not solely be driven by data. Modification indices were used to guide model improvement, and non-significant parameters (t-values <1.96, p> 0.05) were deleted. Finally, model adequacy was assessed based on goodness-of-fit statistics. In order to avoid repetition, only the results of the final model are reported. Table 6-24 shows the descriptive statistics of theoretical constructs of the final measurement model of supply chain relationships. These constructs are to be used in the path analysis.

The results indicate positive correlations between the variables and significant at $p< 0.01$. They also provide indication of the strength of the relationship between variables.

Table 6-24: Descriptive Statistics of the Constructs in the Final Path Model

	Mean Score	Std Dev.	PCC	AMC	PC	SCAP	SCOP	SCFP
PCC	24.15	3.33	1					
AMC	23.67	3.38	0.628**	1				
PC	24.38	3.32	0.636**	0.631**	1			
SCAP	16.24	2.20	0.673**	0.566**	0.692**	1		
SCOP	16.47	2.38	0.703**	0.573**	0.648**	0.677**	1	
SCFP	12.35	1.84	0.665**	0.466**	0.594**	0.659**	0.674**	1

**p< 0.01,

6.6.2 Initial Hypothesized Structural Model

The full initial hypothesised structural model for this research is presented in Figure 6-8. The variables operationalised in the model are adopted from the results of the measurement model using C.F.A. procedures earlier, as explained in Section 6.5. The analyses of the hypothesised structural model are conducted by testing the hypothesised model, which specifies the six causal relationships in Table 6-23. In the path diagram presented in Figure 6-8, exogenous constructs; partner's characteristics capability (PCC), alliance management capability (AMC) and process capability (PC) have no single-headed arrow pointing toward them. A necessary assumption of SEM is that the exogenous constructs must be estimated, even though no correlations are hypothesised (Kline, 2005; Hair et al., 2010).

Endogenous constructs in the model (such as SCAP, SCOP and SCFP) have at least one single arrow heading to them. Single-headed arrows indicate causal relationships or paths, whilst the absence of arrows linking constructs implies that no causal relationship has been hypothesised. Supply chain agility practices which is measured using four items, is posited to be consequences of supply-chain relationship constructs: PCC, AMC and PC. Meanwhile, SCOP and SCFP are posited to be consequences of supply chain agility performance, and supply chain financial performance itself is posited to be consequences of supply chain operational performance. The error terms 'e' represent random error due to measurement of the constructs they indicate. The parameter 'z' represents the residual errors in the structural model, resulting from the random error and/or systematic influences, which have not been explicitly modelled.

In testing the hypothesised model, results presented in Table 6-25 indicate that H1, H3, H4 and H5 are statistically significant in the hypothesised direction. The standardised estimate for these hypotheses are all significant (β=0.70, 0.22, 0.50, 0.88 and 0.61, respectively). Thus, the hypotheses are supported. Hypothesis H2 is also significant but weak with β=0.32. Hypothesis H6 is rejected because it is not statistically fit (β=0.25). Paths in the model are estimated, resulting in chi-square of 709.771 with 361 degrees of freedom, indicating a low model fit and noncompliance with the goodness-of-fit (CMIN=2.546, RMSEA=0.078, CFI=0.798, NNFI=0.778, AGFI=0.672, GFI=0.718). The indices for goodness-of-fit for this initial model are shown in Table 6-29, to make comparison with other rectified structural models, and finalised the structural model.

Table 6-25: Hypotheses Testing for Initial Hypothesized Structural Model

Hypothesized Path	Standardized Estimate (β)	z-value	Supported
H1 PCC → SCAP	0.70	3.61**	Yes
H2 AMC → SCAP	0.32	1.96**	Yes (weak)
H3 PC → SCAP	0.50	3.12**	Yes
H4 SCAP → SCOP	0.88	8.08**	Yes
H5 SCAP → SCFP	0.61	3.82**	Yes
H6 SCOP → SCFP	0.25	1.65	No

Note: * p< 0.05, **p< 0.01(two-tailed test)

Figure 6.8 summarises the results obtained for each hypothesised path. The model demonstrates that one of six paths is not statistically significant (p< 0.01) and one path is found to be weakly significant. Accordingly, re-specification of the model by removing non-significant paths would possibly provide a better fit to the data. It is important to assess the fitness of a modified model by deleting the non-significant paths, therefore allowing the most parsimonious underlying model to be eventually defined. In this study, re-specification is done by removing the weak significant and non-significant paths, to have a model which fits the data well.

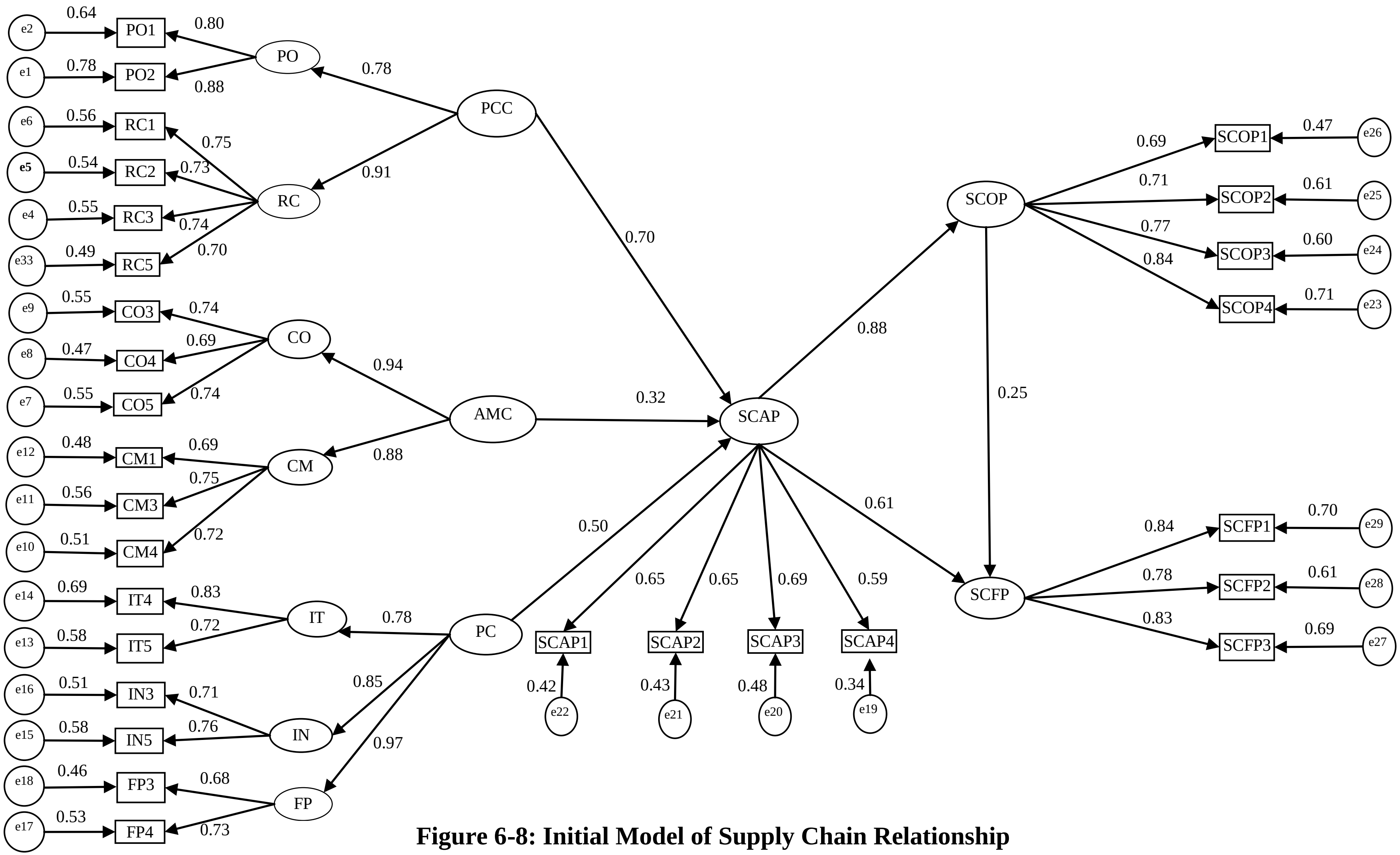


Figure 6-8: Initial Model of Supply Chain Relationship

6.6.3 Rectified Structural Model Two

Taking into account the theoretical basis of the model, the results obtained from testing the initial hypothesised structural model indicate that two paths need to be deleted. However, the deleting procedure is performed by removing one non-significant hypothetical path at a time, as suggested by Holmes-Smith et al.(2006). This is because dropping one path at a time could change the modification indices and structural coefficients, and their significance. Therefore, the weak significant path between AMC and SCAP (H2) was first deleted, due to its low standardised estimate value (0.32). Following this, the model was re-analysed.

The analysis was conducted with the path connecting AMC and SCAP (H2) been removed (see Figure 6-9). The results presented in Table 6-26 indicate that hypotheses H1, H3, H4 and H5 are accepted, because they are statistically significant (β=0.56, 0.44, 0.88 and 0.59, respectively). Hypothesis H6 is rejected, because it is not significant (β=0.26). These results also show a path connecting SCOP to SCFP (H6), which is the second path to be deleted (see Table 6-26).

The goodness-of-fitness show that this rectified model does not fit the model adequately, even though the chi square is significant (χ^2=712.347, df= 362, p=0.000, N=271). The CMIN is 1.968, RMSEA=0.062, CFI=0.908, NNFI=0.897, AGFI=0.799, GFI=0.833). However, these results show that the structural model two is a better fit of the data, in comparison with the initial hypothesised structural model.

Table 6-26: Hypotheses Testing for Rectified Structural Model 2

Hypothesized Path	Standardized Estimate (β)	z-value	Supported
H1 PCC → SCAP	0.56	4.00	Yes
H3 PC → SCAP	0.44	3.23	Yes
H4 SCAP → SCOP	0.88	8.08	Yes
H5 SCAP → SCFP	0.59	3.70	Yes
H6 SCOP → SCFP	0.26	1.75	No

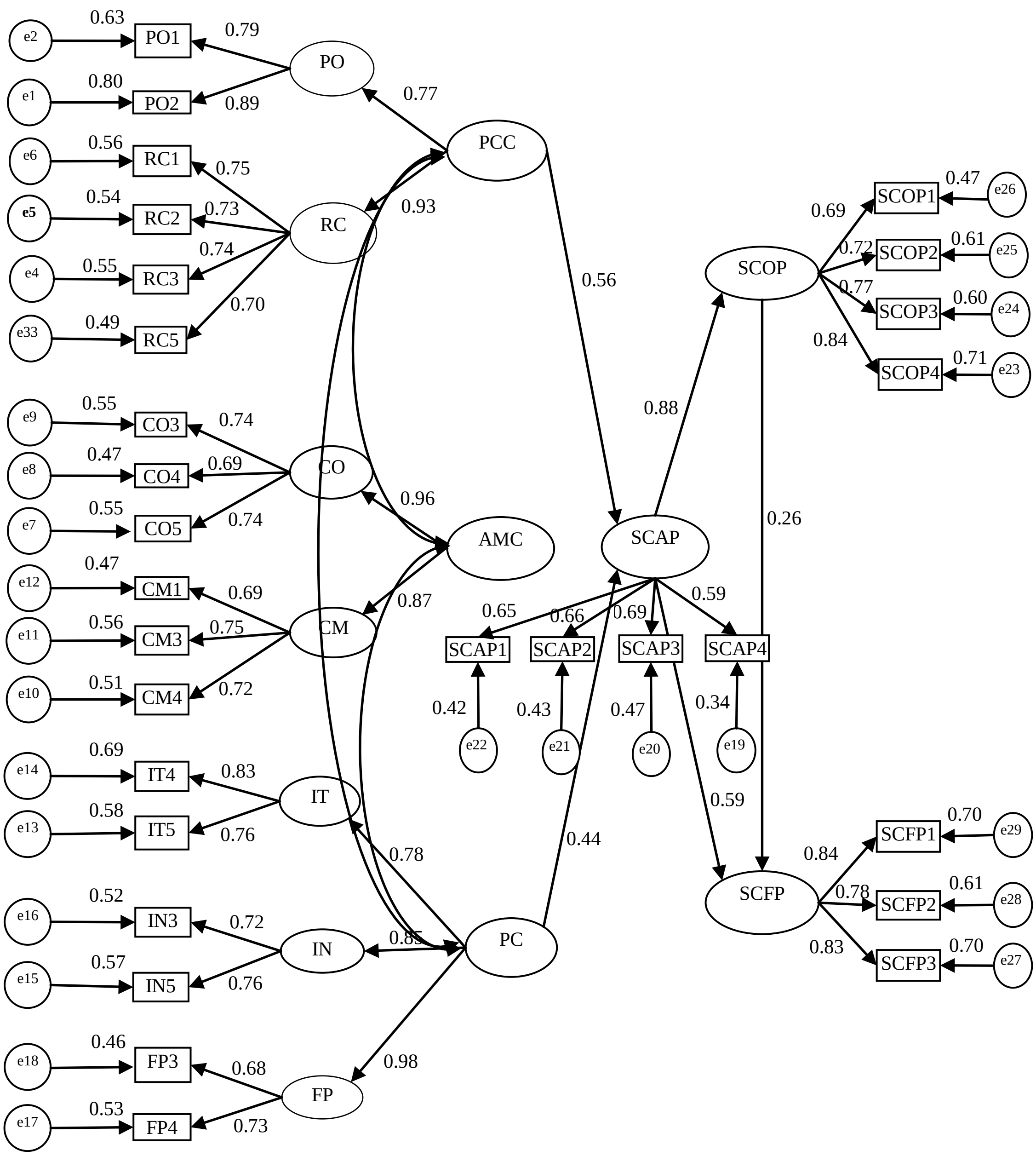


Figure 6-9: Rectified Structural Model 2

6.6.4 Rectified Structural Model Three

Based on the results obtained from rectified structural model two, the analysis for this model was conducted with the path connecting SCOP to SCFP (H6) deleted (see Figure 6-10). As shown in Table 6-27, this model fits H1, H3, H4 and H5, which are derived from testing the initial hypothesised structural model and rectified structural model two. The standardised estimates for these hypotheses are $\beta = 0.58$ for H1, $\beta = 0.42$ for H3, $\beta = 0.90$ for H4 and $\beta = 0.84$ for H5. This table also shows that all paths are significant.

With the two non-significant paths in the hypothesised structural model being deleted, the results obtained from goodness-of-fit indices show that model three does not fit the data adequately. Paths in the model are estimated, resulting in a chi-square of 709.771 with 361 degrees of freedom, thus indicating a low model fit, and incompliance with the goodness-of-fit (CMIN=1.970, RMSEA=0.062, CFI=0.907, NNFI.=0.896, AGFI=0.799, GFI=0.832). It shows no significant difference from the results obtained for rectified structural model two. Thus, it was necessary to further investigate using post hoc analysis focuses on detecting and identifying the source of poor model fit in the originally hypothesised model, based on improvement information from AMOS 16.0 (modification indices).

Table 6-27: Hypotheses Testing for Rectified Structural Model 3

Hypothesized Path	Standardized Estimate (β)	z-value	Supported
H1 PCC → SCAP	0.58	4.11	Yes
H3 PC → SCAP	0.42	3.07	Yes
H4 SCAP → SCOP	0.90	8.17	Yes
H5 SCAP → SCFP	0.84	8.87	Yes

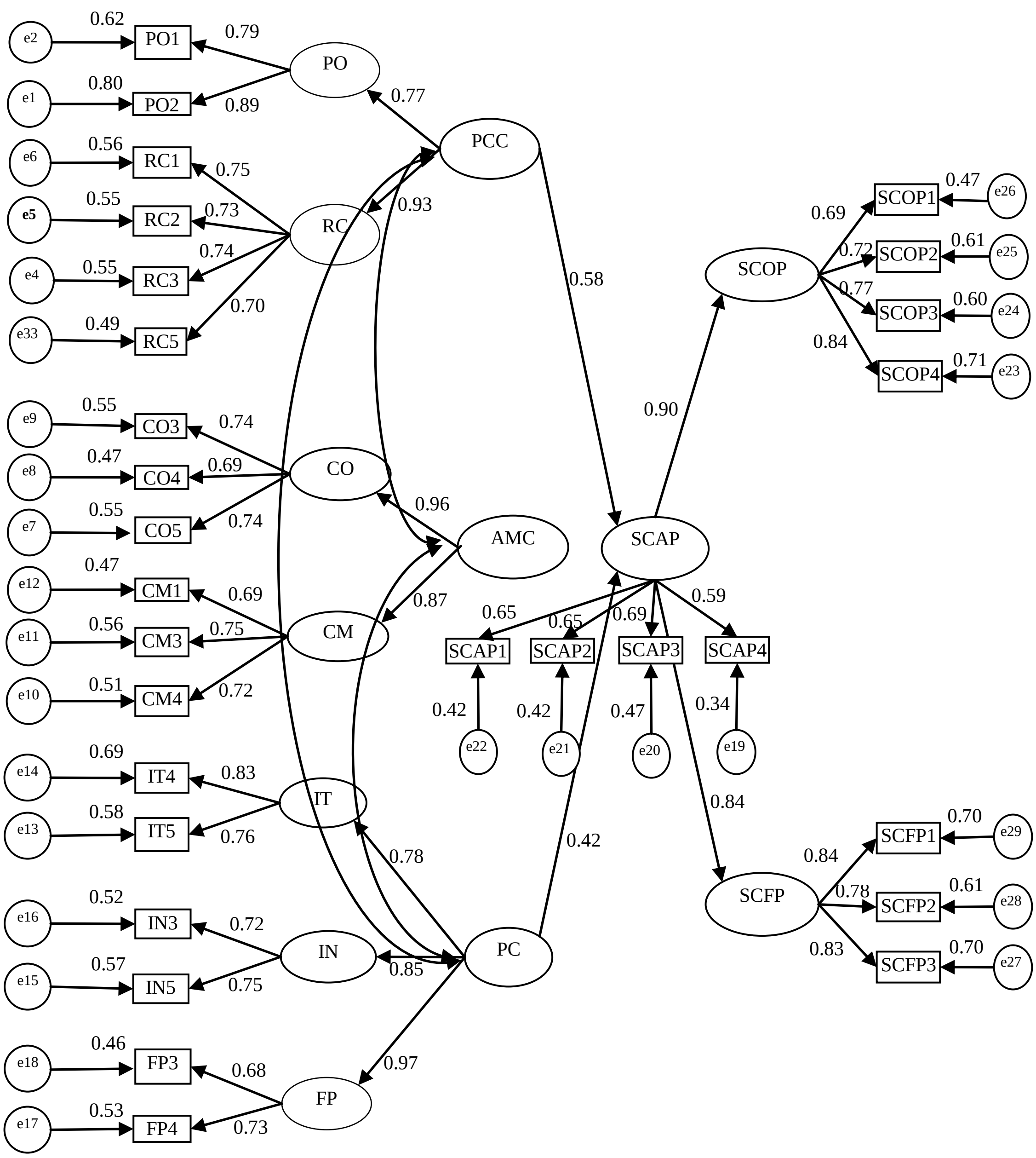


Figure 6-10: Rectified Structural Model 3

6.6.5 Final Hypothesized Structural Model

Based on results obtained from the rectified structural model 3, the analysis for this model is conducted with the initial hypothesised structural model. To achieve the model fit, a model rectification procedure as discussed in section 5.3.4 was performed. High standardised covariance residual values of the model greater than 2 are observed, and used to indicate those items causing the model fit incompliance. The items were further assessed to identify problems associated with interpretation bias, unexpected inter-item correlations and weak relevance to the research context.

The procedure has identified two items causing low model fit (SCAP1 and SCAP2), but the items were not removed because extensive literature review discussed in Chapter 3 revealed the importance of these items in measuring supply chain agility practices. Modification indices were referred to as guidance for model improvement. It was found that repeating the analysis treating the covariance between e22 (SCAP1) and e21 (SCAP2) as a free parameter, the discrepancy fell by at least 32.210. The covariance between these two items produced the final modified model, as presented in Figure 6-11.

Results presented in Table 6-28 indicate that H1, H3, H4 and H5 are statistically significant in the hypothesised direction. The standardised estimated for these hypotheses are all significant (β= 0.77 for H1, 0.47 for H3, 0.89 for H4 and 0.68 for H5). Thus, these hypotheses are supported. H2 which is classified as weak significant with β= 0.36 is also accepted. Only H6 is rejected because it is not statistically fit (β= 0.18). Paths in the model are estimated, resulting in chi-square of 675.328 with 360 degrees of freedom, thus indicating a good model fit and compliance with the goodness-of-fit (CMIN=1.876, RMSEA=0.059, CFI=0.917, NNFI=0.906, AGFI=0.808).

Table 6-28: Standardized Estimates of Final Hypothesized Structural Model

Hypothesized Path	Standardized Estimate (β)	z-value	Supported
H1 PCC → SCAP	0.77	3.75	Yes
H2 AMC → SCAP	0.36	1.97	Yes
H3 PC → SCAP	0.47	2.89	Yes
H4 SCAP → SCOP	0.89	8.22	Yes
H5 SCAP → SCFP	0.68	3.95	Yes
H6 SCOP → SCFP	0.18	1.12	No

Table 6-29 displays the comparison fit indices for the four structural models. Comparing the fit indices for the hypothesized four structural models tested, results clearly confirmed that the final structural model is the model that provides a more parsimonious model. This final structural model is found to be the best model that fits the data well with five hypotheses ((H1, H2, H3, H4 and H5) support the study.

Table 6-29: Comparison Fit Indices

Indices	Initial Structural Model	Rectified Structural Model 2	Rectified Structural Model 3	Final Structural Model
Chi-Square/df	709.771/361	712.347/362	715.034/363	675.32/360
CMIN	2.546	1.968	1.970	1.876
RMSEA	0.078	0.062	0.062	0.059
CFI	0.798	0.908	0.907	0.917
NNFI	0.778	0.897	0.896	0.906
AGFI	0.672	0.799	0.799	0.808
GFI	0.833	0.833	0.832	0.841

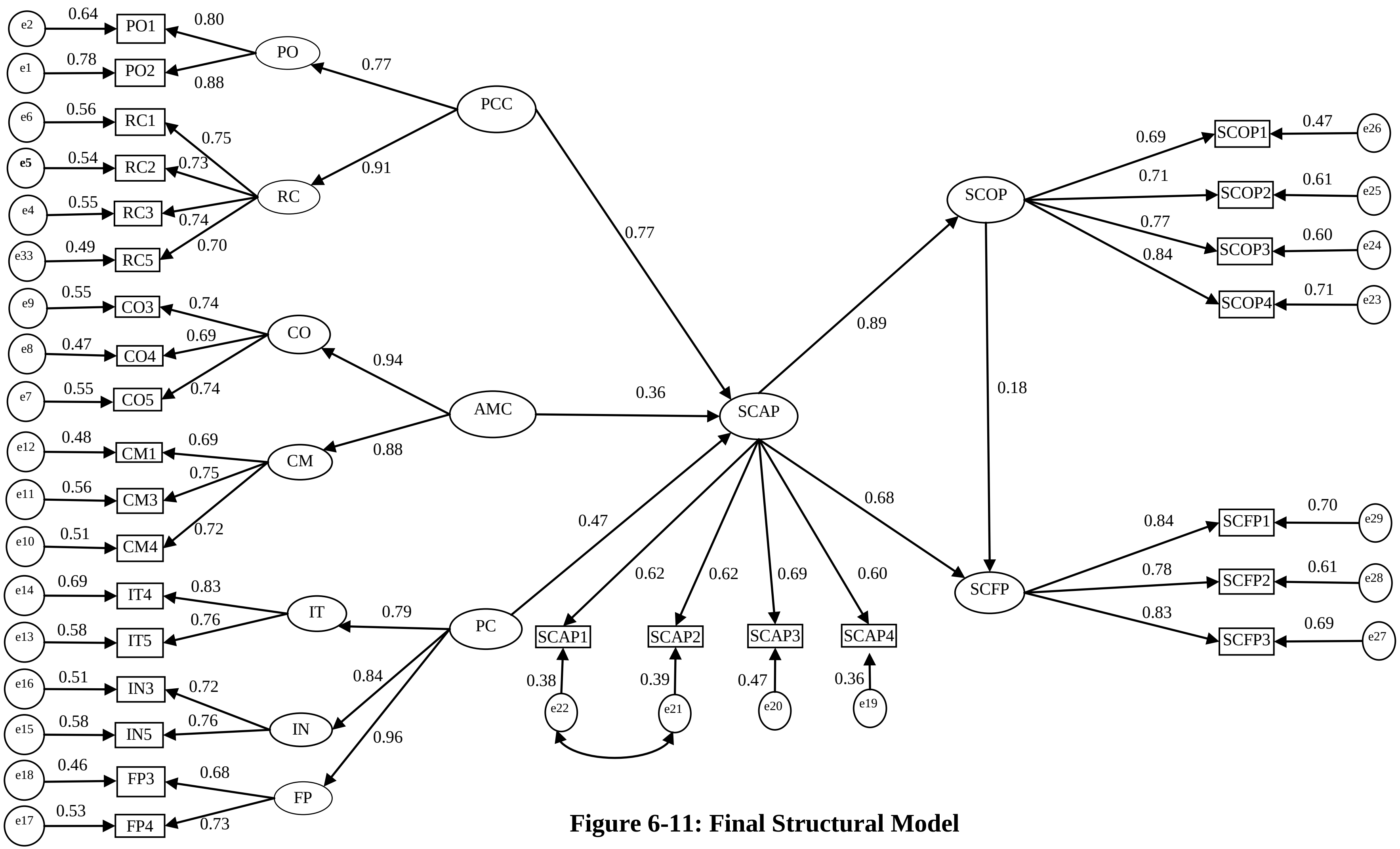


Figure 6-11: Final Structural Model

6.7 Multigroup Analysis

The measurement models and structural equation modelling discussed in Section 6.5 and Section 6.6 respectively were carried out on the samples of MNCs and SMEs, taken together as a single data file. A further analysis was done to ascertain if there was difference in findings for two different MNCs and SMEs groups. Multigroup analysis is the additional analysis carried out, with the objective to examine whether the pattern of structure hypothesised in the path model tested follows the same dynamics for MNCs and SMEs, as described earlier.

6.7.1 Multigroup Confirmatory Analysis

Prior to performing the multigroup analysis for the path model, it is necessary to perform multigroup analysis for the measurement model presented in Figure 6-7, to verify that the 18 measurement items written reflect the three latent constructs of reflecting supply chain relationship. Thus, in investigating group differences in the path model, it is necessary to test whether the factor structure represented by the posited measurement model is the same for both MNCs and SMEs. If the analysis shows no significant differences in regression weights (i.e., factor loadings) between MNCs and SMEs, then the same regression weights can be used for both groups (Ho, 2006). This, in turn, will allow the regression weights themselves to be estimated more efficiently, as well as simplifying the estimation of model-fit.

The multigroup confirmatory analysis demonstrated a multigroup analysis on the path model tested in Section 6.4.2. It attempted to apply path analysis simultaneously to a sample of 133 MNCs and 119 SMEs. The question to be examined is whether the pattern of structural relationships hypothesised in the path model follows the same dynamics for the combined samples of MNCs and SMEs. To test for the group differences in the regression weights for the measurement model specified in Section 6.5.4, it is necessary to set up separate but identical measurement models for MNCs and SMEs samples, link the models to the respective data sets, and set up an invariant model that can be directly compared as to their model fitness.

Table 6-30: Nested Model Comparison (CFA)
Assuming model group variant to be corrected:

Model	CMIN	DF	P
Group Invariant	16.172	11	0.135

Significant at $p < 0.05$

Table 6-31: Model Fit Summary of Multigroup Confirmatory Factor Analysis

Model	CMIN	DF	CMIN/DF	RMSEA	AIC
Group Invariant	456.104	261	1.748	0.055	618.104
Group Variant	439.931	250	1.760	0.055	623.931

The model-fit of MNCs and SMEs models can be directly compared from the nested model comparison and model fit summary. Comparing the two models (group invariant and group variant) from nested model comparison in Table 6-30, it can be seen that the chi-square difference value for the two models is 16.172. With 11 degrees of freedom, this value is not significant at 0.05 level ($p>.05$) Thus the two models do not differ significantly in their goodness-of-fit.

The fit of the two models can also be compared using AIC measure as reported in Table 6-31. In evaluating the hypothesized model, this measure takes into account both parsimony and model fit. The AIC measure (Akaike, 1973, 1987) revealed group model invariant with lower AIC score is more parsimonious and better fit than the group variant whereby the group invariant model's estimates are preferable over group variant. The unstandardized regression weights for MNCs and SMEs are all significant by the critical ratio test ($> \pm1.96$, $p < 0.05$), which indicate the 18 measurement items are all significantly represented by their unobserved constructs for both the MNCs and SMEs groups.

6.7.2 Multigroup Path Analysis

Once the measurement models for both MNCs and SMEs have been confirmed, the fit of the structural path posited for these two groups can be evaluated and compared. The factor structure confirmed the measurement model is used as the foundation for the path model. Six constructs of supply chain relationship such as PCC, AMC, PC, SCAP, SCOP and SCFP, together with their respective measurement indicators are incorporated into structure of the path model to be evaluated. Multigroup analysis is employed to apply this model simultaneously to MNCs and SMEs samples. The question to be examined is whether the pattern of structural relationships hypothesized in the path model follows the same dynamics for MNCs and SMEs combined samples.

Table 6-32: Model Fit Summary Multigroup Path Analysis

Model	CMIN	DF	CMIN/DF	RMSEA	AIC
Group Invariant	1224.170	693	1.766	0.055	1462.170
Group Variant	1222.861	688	1.777	0.056	1470.861

Table 6-33: Nested Model Comparison (Path Analysis)
Assuming model group variant to be corrected:

Model	CMIN	DF	P
Group Invariant	1.308	5	0.934

Significant at $p<0.05$

The results displayed in Table 6-32 show both group invariant and group variant models yield good fit by the chi-square goodness of fit test. However, comparing the two models from nested model comparison displayed in Table 6-33, the model assuming model group variant to be corrected is not significant at 0.05 level, thus the two models do not differ significantly in their goodness-of-fit. By comparing the two models using AIC measure (Akaike, 1973, 1987) group model invariant with lower AIC score is both more parsimonious and better fitting, and correct than the group variant, estimates are preferable over group variant model's estimates.

As analysis revealed that off the six coefficient associated with the paths, five are significant by the critical ratio test (> ±1.96, $p< 0.05$). The one non-significant coefficient for both MNCs and SMEs is associated with direct path linking SCOP to SCFP. The results are displayed in Table 6-34.

Table 6-34: Unstandardized and Standardized Regression Weights for Multigroup Path Analysis

Hypothesized Path	Standardized Coefficient (β)		z-value	p-value	Supported
	MNC	SME			
H1 PCC → SCAP	0.83	0.50	4.452	0.000**	Yes
H2 AMC → SCAP	0.32	0.24	2.108	0.035*	Yes
H3 PC → SCAP	0.51	0.58	4.017	0.000**	Yes
H4 SCAP → SCOP	0.89	0.89	9.542	0.000**	Yes
H5 SCAP → SCFP	0.76	0.66	4.099	0.000**	Yes
H6 SCOP → SCFP	0.10	0.20	0.533	0.594	No

** significant at (p<0.01) * significant at (p<0.05)

Figure 6-12 and Figure 6-13 exhibit the structural path model for MNCs and SMEs samples respectively as the final output of multigroup path analysis. From the figures, it can be concluded that multigroup analysis performed proved that there is no significant different between results yielded from the path analysis tested on both combined MNCs and SMEs samples. The findings further supported the hypothesis testing tested in the path model of the combine samples of MNCs and SMEs in Figure 6.11.

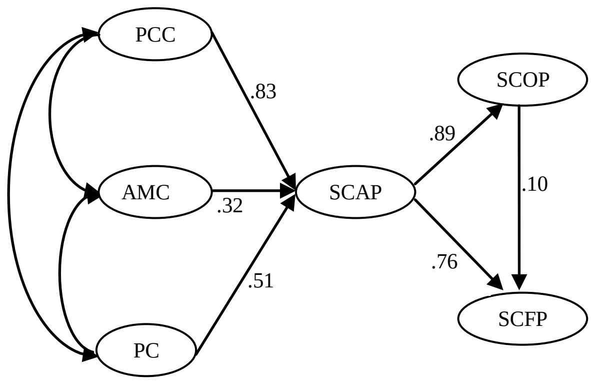


Figure 6-12: MNCs Structural Path Model with Standardized Path Coefficient

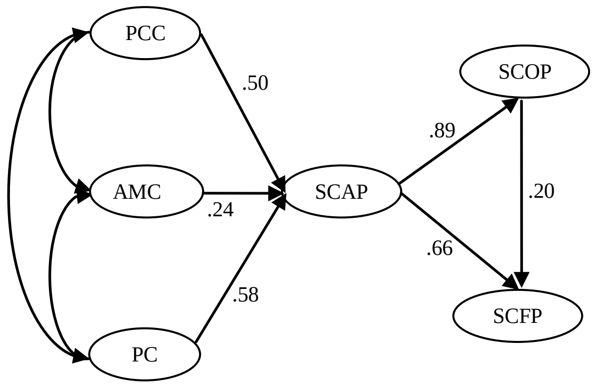


Figure 6-13: SMEs Structural Path Model with Standardized Path Coefficient

6.8 Summary

Data analysis in this thesis has been preceded with data editing from collected questionnaires and the coding of question items. Data screening and preliminary data analysis, including descriptive statistics and sample characteristics are discussed. Data screening was performed prior to conducting SEM, as the latter is very sensitive to missing data, normality, and sample size. Following this, the number of respondents was analysed and demographic characteristics of this sample have been described.

The second part of data analysis is the use of SEM, which is conducted in two stages, the measurement model and the structural model. In the first stage, the fit of each one factor congeneric and measurement model is assessed by using a CFA of the constructs of interest to make sure that each one is uni-dimensional. At this stage the assessment of the measurement model is made with reference to the following pattern of results:

i. indicators specified to measure a proposed underlying factor all have relatively high standardized loadings (i.e., >.65) on that factor

ii. estimated correlations between the factors are not higher than .85;

iii. the overall goodness-of-fit indices suggest acceptance of the model. These assessments have also been undertaken in addition to examining normalized residual and modification indices.

Accordingly, initial results indicate that the measurement model of this thesis needs to be re-specified and tested again in an attempt to provide a more parsimonious model which will be used in the next step of the structural model. It was decided to delete seven items of partner's characteristics capability (PCC), five items of alliance management capability (AMC), and six items of process capability (PC), as the factor loadings are <.65. This was done to improve the convergent and discriminant validity. The modified measurement model provides adequate fit to the data, and all indicators are highly loaded on their specified factors. Each factor construct was then tested for reliability and validity.

In regards to reliability, Cronbach's alpha and CR were examined jointly with AVE. Results obtained indicated that all constructs were reliable. In addition, in order to confirm the validity for each construct, convergent, construct, and discriminant validity were also assessed. Strong evidence was found for considering the constructs in this thesis as valid and adequate for use in the next stage (structural model) to test the hypotheses. The hypothesised structural model to be tested is specified by including the constructs after validation in the measurement model. The hypothesized model (original structural model) was tested in the second stage, including six paths representing the hypotheses (H1, H2, H3, H4, H5 and H6). One of the six hypotheses (H6) was found not statistically significant. H2 was found to be weak significant. Therefore, re-specification of the original model is needed to provide the most parsimonious model. The original structural model was respecified with only one path representing the hypothesis H2 deleted. Dropping one path at a time was necessary, because modification indices and structural coefficient and their significance could be changed. The second path representing hypothesis H6 was also then deleted. The analysis is then performed without these paths, resulting in the rectified structural model (three). However, the model does not fit the data which require the model to be rectified (final hypothesised structural model) using modification indices instead of deleting the non-significant paths. The overall fit indices indicate that the final hypothesised structural model is the best fit of the data when the hypotheses H1, H2, H3, H4 and H5 are accepted, and the hypothesis H6 is rejected. Analysis is extended with multigroup analysis to examine whether the structural relationships hypothesized followed the same dynamics for MNCs and SMEs groups. Multigroup confirmatory factor analysis and path analysis confirmed that there was no significant different between findings from MNCs and SMEs groups. The multigroup analysis results are found to be consistent with the final structural model.

The next chapter discusses the above results in detail in order to answer the research questions and objectives outlined in Chapter 1.

CHAPTER SEVEN
DISCUSSION OF FINDINGS

7.1 Introduction

Chapter 6 of this thesis presented the statistical results that examined the hypotheses identified in Chapter 3. This chapter will discuss the statistical results with the objectives to:

1. Provide an overview on the direct effects of the antecedents of supply chain relationships; and
2. Report and discuss the results of hypotheses-testing.

The discussion of this chapter is organized with brief introduction in Section 7.1, while Section 7.2 clarifies the creation of supply chain antecedents for this research. Sections 7.3, 7.4 and 7.5 report the impact of each supply chain relationship antecedent on supply-chain agility practices. The impact of supply chain agility practices on operational and financial performance is discussed in Sections 7.6 and 7.7. The impact of supply chain operational performance on supply chain financial performance is highlighted in Section 7.8. Each section starts with a review of the hypotheses, and then presents results from the structural model and interpretations of the findings, from the perspectives of both supplier and buyer. Lastly, the summary of the chapter is explicated in Section 7.9.

7.2 Creations of Supply Chain Relationships Antecedents

Antecedents of supply chain relationships in agile environments are relatively new to the field of supply chain management. The main objectives of this study (Chen et al., 2009) are to investigate the antecedents of supply chain relationships on supply chain agility practices, and the impact of agility practices on operational and financial performance by using outputs of the SEM. Hence, to answer the research question and objectives posed in Section 1.5, a proposed framework and a set of hypotheses were tested, as described in Chapter 3 of this thesis. The primary research question of what are the antecedents of supply chain relationships in agile environments was derived from extensive literature reviews, as discussed in Chapter 3. For the purpose of this study, three antecedents of supply chain relationships have been identified as essential antecedents in developing virtuous relationships with members in the supply chain:

i. Partner's characteristics capability (PCC);

ii. Alliance management capability (AMC); and

iii. Process capability (PC).

These antecedents were identified as the organisational resources and capabilities theorized in the Resource-based view (RBV) and Extended Resource-based View (ERBV) theories, discussed in Section 3.2.

According to the RBV theory, emphasis is put on the nature of resources brought by the partners (Nasiriyar & Jolly, 2006; Chen et al., 2009; Li et al., 2012). The theory provides an explanation of competitive heterogeneity, based on the premise that close competitors differ in their resources and capabilities in important and durable ways (Helfat & Peteraf, 2003; Schmidt & Keil, 2012). The theory suggests that if appropriately utilised, both tangible and intangible resources and knowledge may contribute to firms' competitive advantage, as they are valuable, rare, cannot be duplicated, and have no substitutes (Barney, 1991). This leads to the development of a dynamic capability approach. While the term 'dynamic' refers to the capacity to renew organisational resources and capabilities to achieve congruence with the changing business environment, the term 'capability' emphasises the role of strategic management in appropriately adapting, integrating, and reconfiguring internal and external organisational resources and competencies to match the requirements of the changing environment (Teece et al., 1997; Lee, 2001). Some organisations are more capable with resources than others, may leverage them more effectively, perform much better than other organisations, and thereby attain competitive advantage. Thus, variability in organisational performance resides not only from firm-specific resources and structures, but also from how they are deployed to achieve organisational strategies and objectives. Moreover, organisations equipped with a variety of strategic options are expected to garner enhanced organisational performance even during dynamic times (Grewal & Tansuhaj, 2001; Sinkovics & Roath, 2004) .

In today's globally competitive economy, there is ample evidence that customers are demanding lower prices, better quality, more variety and faster delivery (Zhang et al., 2003; Kisperska-Moron & de Haan, 2011). In order to compete in this environment, it is believed that competition will not be company versus company, but will be supply chain versus supply chain (Christopher & Towill, 2001; Cao & Zhang, 2011). Recent organisation literature has bridged supply chain management and strategic management literature to argue that competition no longer revolves around individual organisations, but the supply chain is increasingly becoming the focus of competition in the market (Crook & Combs, 2007; Holcomb & Hitt, 2007). Moreover, turbulent and volatile markets are becoming the norm, as lifecycles shorten and global economic and competitive forces create additional uncertainty. The risk attached to lengthy and slow-moving logistics “pipelines” has become unsustainable, forcing organisations to refocus on how their supply chains are structured and managed (Christopher, 2000). This change in focus necessitates organisations to collaborate with members in the supply chain, and upgrade their supply chain management functions. Only through close collaborative linkages through the entire supply chain can one fully achieve the benefits of cost-reduction and revenue enhancing behaviour (Spekman et al., 1998; Creswell, 2009). Further, Spekman et al.,(1998) mention that while reduced cost is typically a result, supply chain management should emphasise leveraging the skills, expertise and capabilities of the firms who comprise this competitive network referred to.

Organisations have long acknowledged the importance of getting close to their key customers. Now that this logic has extended upstream as well, it is also important to forge close ties to one’s key suppliers (Lang, 2001). It is therefore sensible for the definition of supply chain management to emphasise relationships between members in the supply chain, as the concept of supply chain management and relationships could be useful in meeting the goals of the agile supply chain, which is to respond rapidly to changes in demand, both in terms of volume and variety (Christopher, 2000; Kisperska-Moron & de Haan, 2011). Relationships between organisations are increasingly important, in terms of both competitiveness and developing dynamic capability to respond to rapid changes in the market. Further, resources and capacity – both in individual organisations and partners in supply chains – are also integral in responding to dynamic markets and customer needs. Recent management literature suggests that relying on just the individual or the single focal organisation for economic and industry competitiveness is unsustainable (Hamel & Breen, 2007). Relatively high levels of supplier and buyer integration is necessary to cope with uncertainty in volume, mix and lead time (Agarwal et al., 2006).

After a thorough literature review and validation of the scales through pre-test, pilot study and main study, scales to measure antecedents of supply chain relationships and supply chain agility practices were created. From the practitioners' perspective, the RBV and ERBV theories reflect many of the developments that are employed in the management of a business and supply chain. The availability of validated scales can help organisations measure their current level of resources, capabilities and supply chain agility practices. With the conceptualisation of supply chain relationships in the framework, the ability to analyse which organisational resources and capabilities within the organisation that may need to be developed in building long-term working relationships with partners in the supply chain (Cheung & Rensvold, 2002).

From an academic standpoint, having a validated measure of supply chain relationships is beneficial to support future research in the area of supply chain management in general, and supply chain relationships in particular. Reuse of this instrument in different settings will lend additional support to its validity as a measurement tool.

Table 7-1 below shows all the six hypotheses developed from the extensive literature reviews. The findings of every hypothesis are elaborated in the following sections.

Table 7-1: Hypotheses Developed for this Study

Hypotheses	Description
H1	Partners' Characteristics Capability has a significant positive effect on supply chain agility practices
H2	Alliance Management Capability has a significant positive effect on supply chain agility practices
H3	Process Capability has a significant positive effect on supply chain agility practices
H4	Supply chain agility practices have significant positive effect on supply chain operational performance
H5	Supply chain agility practices have significant positive effect on supply chain financial performance
H6	Supply chain operational performance has a significant positive effect on supply chain financial performance

7.3 The Impact of Partners' Characteristics Capability on Supply-Chain Agility Practices

The central research question is posited to examine the impact of antecedents of supply chain relationships on supply chain agility practices. This first section explains the results of testing the hypotheses related to the relationship between partner's characteristics capability and supply chain agility practices. In the proposed model, this thesis hypothesised that partners' characteristics capability has a significant positive effect on supply-chain agility practices. Therefore the first hypothesis proposed was;

H1: Partner's characteristics capability has a significant positive effect on supply chain agility practices

From the analysis, it reveals in agile environments, partner's characteristics capability was found to have a strong positive relationship with supply chain agility practices, providing support for hypothesis one (H1). The role of partner's characteristics in strategic relationship outcomes has been explained in many studies by past researchers (Luo, 1997; Das & Teng, 2000; Sarkar et al., 2001; Das & Teng, 2003; Merchant, 2005; Meier, 2011). Two developed sub-factors contributed to the significance of this hypothesis were partners' compatibility (Liou et al., 2011) and resources complementarities (Hess & Rothaermel, 2011). These two sub-factors are able to explain a significant portion of the variance in the supply chain relationships in agile environments. Certainly this is a powerful indication of partner's characteristics capability sub-factors which organisations must adopt in order to develop strategic alliances with buyers or sellers in agile environments.

Partner compatibility is measured using two dimensions; similarity in values and norms of the organisation and compatible organisation goals and objectives. The findings suggest that MNCs and SMEs look for partners who portray compatibility in terms of similarity in values and norms and compatible goals and objectives. Firstly, partner compatibility may be seen as an important supplier selection measure. Dwyer et al.,(1987) and Kumar (1996) proposed that firms should select partners which possess similar values to reduce conflict. One of the most often-cited reasons for alliance failure is the incompatibility of partners (Dacin et al., 1997; Liou et al., 2011).

This suggests that organisations may able to develop long-term, mutually-beneficial relationships with alliances having similarity in organisational beliefs and objectives

(Khalid & Larimo, 2012). To reduce the possibility of strategic alliance failure due to conflicts, MNCs and SMEs may perhaps prepare to collaborate with compatible partners. This requires them to first understand their partner's objectives, as well as the criteria used by their partners in selecting partners in the supply chain, and have a common vision to achieve alliance performance.

Secondly, past research has confirmed that the value of complementary resources also creates the potential for greater synergy from acquisitions and alliances. In turn, the synergy leads to higher long-term firm performance as an end result (Harrison et al., 2001; Hess & Rothaermel, 2011). The valuable, unique, and inimitable collaboration that can be recognised by integrating complementary resources provides opportunity for the organisation to create competitive advantages which can be sustained for a period of time (Yin, 2009; Yang & Lin, 2012). Complementary resources present opportunities for enhanced learning, as well as the development of new capabilities (Lin, 2012) . This study reveals that MNCs and SMEs may perhaps select partners which have extensive knowledge about their customers (Reinhold & Alt, 2012), wide channels of distribution (Kashyap & Sivadas, 2012), rich knowledge on the industry, and ability to develop good links with major buyers/suppliers in the supply chain (Vaaland & Owusu, 2012). These unique organisational resources and capabilities must be effectively integrated and managed to realise the successful relationships between buyer and supplier, and implement efficient supply chain agility practices.

Strategic alliances offer attractive means for enhancing resource bundles when an organisation's current capabilities are not sufficient to achieve desired outcomes

(Hoskisson & Busenitz, 2001). Alliances provide access to complementary assets, which do not require investment or long-term commitment, and generally provide firms with access to their partner's resources. As such, firms often search for partners with resources that they are lacking to complement their own (Doh, 2000; Gulati et al., 2000). In support of this conclusion, Stuart (2000) found that a firm's resource profile is an important antecedent of the supply chain relationship formation process. For example, this study showed that younger and smaller firms without cutting-edge technology formed alliances with larger firms with market-leading technology.

Hitt et al. (2000, p. 449) suggest that, "Alliance partner selection does not occur in a vacuum." In a study of international alliances, they discovered that organisations in emerging markets were more likely to select partners based on financial assets, technical capabilities, intangible assets and willingness to share expertise, than those in developed markets. Organisations in developed markets attempted to leverage their resources by emphasising factors such as unique competencies and local market knowledge. In both cases, the organisations were seeking resources which were complementary to their own. It is proven from the findings of this study that MNCs and SMEs in the Malaysian electrical and electronics Industry prefer to have strategic alliances with partners with complemented resources.

In summary, value creation through strategic supply chain relationships requires the simultaneous pursuit of partners with similar characteristics on certain dimensions. Partner's compatibility in terms of comparable organisational values, norms, goals and objectives should be understood as the specific resources and capabilities operating within a supply chain, and under control of participating organisations. Besides, the role of complemented resources by partners in the supply chain is an important factor in the formation of networks between MNCs and SMEs in Malaysian electronics. Networks in the supply chain benefit participating organisations because they can share and combine information, skills, and resources to develop advanced innovation and reduce costs and share risks (Van Gils & Zwart, 2009). Participating organisations thereby, given the opportunity to remain competitive in complicated and highly volatile environments require ‘partner fit,’ in terms of high capability complement (i.e., partners have different capabilities) and high compatibility (i.e., partners’ organisational values and norms, and objectives).

This explains why organisations are generally motivated to engage in inter-organisational relationships. Partner fit (Anderson & Gerbing, 1984; Kale et al., 2000; Harrison et al., 2001) presents opportunities for organisations to create additional value and grasp the potential of such strategic relationships (Chung et al., 2000; Hitt et al., 2000; Sambasivan et al., 2013). Moreover, organisations’ abilities to leverage resources will impact on how well-equipped it is to engage in strategic alliance activities (Anderson & Gerbing, 1984; Thorgren et al., 2010).

In agile environments, resources exchanged and shared with partners in the supply chain may be one of the sources of value and competitive advantage which impact on the supply chain agility practices. The potential for increased supply chain agility practices may be achieved when both MNCs and SMEs fulfil the partner compatibility dimensions, and provide complemented resources required by partners. Both entities may be able to respond quickly to changes in demand with this availability of complemented shared resources and capabilities. Perhaps the objectives of increasing new product development, product customisation, reducing manufacturing lead-time and acting promptly to changes in customer requirements can be achieved through dynamic partner characteristics, and capability of organisation.

7.4 The Impact of Alliance Management Capability on Supply-Chain Agility Practices

This section explains the results of testing the hypotheses related to the relationships between alliance management capability and supply chain agility practices. The proposed model hypothesised that increased alliance management capability in the dyad increases supply-chain agility practices. Therefore the second hypothesis proposed was:

H2: Alliance management capability has a significant positive effect on supply chain agility practices

In this study, the analysis reveals that in agile environments, alliance management capability has a weakly significant positive effect on supply chain agility practices, providing support for hypothesis two (H2). Market turbulence arising from factors such as rapid introduction and customisation of products, difficult design specification, and customer shifts, make continuous contact with customers and suppliers through supply chain integration highly important (Russ & Camp, 1997; Davenport, 1998). In addition, various functions and spatially distributed operational processes of companies require more co-ordination and integration between alliance partners (Meier, 2011). Despite the fact that they represent a growing element of business strategy, alliances between organisations are quite often result in failure due to conflicts arising between alliance partners. This is partly due to the fact that organisations have not built up adequate capabilities to manage alliances. Despite the weak relationship between alliance management capability and supply chain agility practices, special management techniques needed to be implemented in order to strengthen the alliance management capability of both MNCs and SMEs in Malaysia's electrical and electronics industries.

In this study, two developed factors of alliance management capabilities were cooperation between partners, and conflict management. Both factors were validated through pre-test and pilot study, prior to the large survey. These two factors are able to explain a significant portion of the variance in the supply chain relationships in agile environments. Further to the explanation in Section 3.6.2, cooperation has been defined as similar or complementary coordinated actions taken by firms in interdependent relationships to achieve mutual outcomes, or singular outcomes with expected reciprocation over time (Anderson & Narus, 1990). Morgan and Hunt (1994) expanded the definition by emphasising the proactive aspect of cooperation, versus being pressured to take interdependent actions. The interaction of cooperation results in cooperative behaviour allowing the relationship to work, ensuring that both parties receive the benefits of the relationship.

The survey approach used a dyadic research design to identify the key elements of cooperation which impact alliance management capability. Three dimensions of cooperation found to be significant in this study were firstly sharing operational information with the partners (Nicolaou et al., 2011); secondly cooperation with partners in venturing into new business (Zhang et al., 2010); and thirdly, making strategic decisions in consultation with alliance partners (Lavie & Singh, 2012).

Perhaps, organisations are alerted with these dimensions which partners emphasise for long-term beneficial relationships in business.

It is generally acknowledged that information exchange plays an important role in strategic alliances. However, little is known with respect to the perceptions each alliance partner has concerning information exchange as well as how to measure these perceptions. Key managers and executives who participated in this survey agreed to the significance of sharing operational information with partners. The findings revealed that for cooperative behaviour and to avoid conflicts between partners in the supply chain, MNCs and SMEs prefer to engage with partners who are willing to share operational information. This may due to the fact that agile supply chains require organisations to contend with the challenges posed by the fact that markets are turbulent, and changing rapidly and unpredictably. Ever-greater rates of technological innovation in products and processes, as are shorter lifecycles. To meet these challenges, it is necessary for organisations to synchronise their operations with partners in the supply chain.

Sharing operational information with partners through process alignment is a form of cooperation that is becoming more dominant as organisations may focus on managing their core competencies and outsource other activities. With this, MNCs and SMEs are capable of predicting and responding to real and changing demand with the assistance of information technology as means of sharing information. A greater reliance on alliance partners becomes inevitable as new, extended relationships need to be developed to form buyer-supplier teams.

Another finding of this hypothesis disclosed that cooperation between both MNCs and SMEs in this study may extend to venturing into new business with the partners. Dyadic relations in business do not occur in isolation, but are connected to one another, and can fruitfully be considered within a context of connected network relations. A successful strategic alliance may result in the extension of new business projects with the alliance partners. The experience gained from the alliance may result in creating new inter-organisational routines (Hoang & Rothaermel, 2005) that facilitate coordination between the alliance partners. According to Kale et al.,(2002) firms with prior alliance experience are more likely to establish a dedicated alliance function, which contributes to improved alliance performance. As time goes on in a relationship, partners come to know whether the other partner can be trusted. This in turn allows the alliance partners to learn about the other party's idiosyncrasies and develop an understanding between partners. This would lead into opportunity to venture into new business with alliance partners, which adds another dimension of improving alliance performance. It indicates the positive effect of good cooperation given to alliance partners.

This study also found that MNCs and SMEs consult their partners before making any strategic decision. Organisations may consult their alliance partners for their ideas, opinions, and strategies. For example, supply chain design for electrical and electronics products is effectively determined during the product development stage, when product, process and information systems decisions are specified and determined.

The nature of relationships between customers, manufacturers and suppliers are often established early in the new product development process (Handfield & Bechtel, 2002; Ragatz et al., 2002). It is at this stage that critical decisions are made, not only with respect to the functionality of the product for the customer, but indeed the packaging, the distribution channels, the materials source, as well as the selection of product and process technology which will provide the end customer with the desired functionality. In other words, consultation with partners on strategic issues and decisions should start at the earlier stages of new product development (NPD) (Albers & Klaas-Wissing, 2012) to avoid any conflict which could possibly arise at the later stages of the production process. This is further supported by Spekman et al., (2002) that partners must share similar perspectives, have alignment in key processes, and must acknowledge that without joint effort, they are doomed.

The findings of this hypothesis also support three instruments of conflict management that organisations may need to focus on to avoid conflict arising between partners in the strategic alliance. They are mechanisms to resolve conflicts (Sambasivan et al., 2013), undertake joint problem solving (Shi & Liao, 2012) and cultural sensitivity with resolving conflicts (Zacharia et al., 2011).

Supply-chain practitioners have for a long time calculated the cost to serve customers; to meet their requirements better, and to optimise the supply chain (Dull et al., 2003). Traditionally the optimisation of supply chain focused on improving the processes to deliver products to customers in the most cost-effective way. However, managing relationships with partners in the supply chain offers opportunities which go far beyond cost containment. Organisations that enjoy the highest profitability in their industries are those that have invested in developing a very specific mechanism of customer relationship management capabilities, or refer as alliance management capabilities in this study.

Conflict certainly occurs in any type of inter-organisational relationship over an extended period of time. This study would suggest organisations to select partners who understand how to manage relationships and overcome conflicts if they arise with their partners. Organisations must show commitment to the relationship if strategic alliances are to work, as the manner in which conflict is resolved has direct implications for the success and continuity of the relationship. Organisations should therefore have a set of conflict management mechanisms for good alliance management. Perhaps, organisations should have constructive conflict resolution techniques which focus primarily on joint elimination of the conflict or persuasion. This form of behaviour is more likely to result in positive outcomes, as joint efforts are applied to find an integrative, synergistic solution when the concerns of buyers and suppliers are considered too critical to the outcome of the relationship to be compromised.

Another finding from this study might suggest organisations and their partners to encourage their workers to be culturally sensitive with resolving conflicts. Potential problems may arise from the cultural diversity of different organisations. Managing cultural diversity has thus received considerable attention in the social and organisational literature (Chemers et al., 1995; Bell, 2012). The issues of the culturally diverse workplace have also emerged arising from cultural differences in diverse workplaces within and inside organisations. Thus, the objectives of increasing new product development, product customisation, reducing manufacturing lead-time and acting promptly to changes in customer requirements may be achieved through dynamic alliance management capability of organisations.

7.5 The Impact of Process Capability on Supply Chain Agility Practices

This section explains the results of testing the hypotheses related to the relationship between process capability and supply chain agility practices. The proposed model hypothesised that increased process capability in the dyad, increases supply chain agility performance. Therefore the third hypothesis proposed was:

H3: Process capability has a significant positive effect on supply chain agility practices.

SEM findings revealed that in agile environments, process capability has a strong positive effect on supply chain agility performance, providing strong support for hypothesis three (H3). It can be concluded that increased process capability in the dyad increases supply chain agility practices. Three developed scales contributed to the significant of this hypothesis were information technology (Prajogo & Olhager, 2012), process innovation (Zacharia et al., 2011) and flexibility proficiency (Chan & Zhang, 2011) capabilities. These three factors were able to explain a significant portion of the variance in the supply-chain relationship in agile environments. Certainly this is a powerful indication of what process capability that organisation should develop for successful supply chain relationships, and further increases their supply chain agility practices.

The first significant factor of process capability is information technology. It was measured using the two validated instruments. These are frequency of information exchanged, and keeping partners informed of any changes made in the decision process, using information technology infrastructure. Both instruments have significantly contributed to the relationship between supply chain relationship and supply chain agility performance.

As mentioned by Boyer and Lewis (2002) and Flynn and Flynn (2004), global competition and escalating customer expectations have led manufacturers to increasingly focus on delivery speed, dependability and flexibility. Thus to enhance these capabilities, many companies have implemented supply chain integration (SCI) strategies to combat the stark reality: anticipate, respond, and react to the growing demands of the marketplace, or organisations may perish.

Now, more than ever, effective business strategy centres on aggressive, efficient use of information technology (Nah et al., 2001; Prajogo & Olhager, 2012) for business survival (Nicolaou et al., 2011). It is found in this study both MNCs and SMEs respondents agreed that to develop a good supply chain relationship, information between alliances partners should be exchanged frequently in a timely manner with the use of information technology. The finding seems to support the notion that increases in the frequency of exchange information lead to greater collaboration among supply chain partners. This view is supported by Mohr and Spekman (1994) that communication is an essential ingredient, and lies in the heart of information transfer. The frequency, complexity and content of information communicated certainly affects the existing information known by alliance partners, and ability to respond quickly to any changes in the marketplace (Podsakoff et al., 2003). Adopting agile supply chains definitely requires organisations to exchange order, demand, inventory and distribution information to improve the overall supply chain performance when the demand of products is unpredictable.

Besides exchanging information frequently in a timely manner, keeping alliance partners informed of any changes is found to be a significant factor of supply chain relationships to affect supply chain agility (Goffin et al., 2006). Again, successful relationships in agile supply chains may require organisations to communicate with their partners on changes made to the strategic issues which might affect members in the supply chain. In a strategic alliance, partners must have some common operational information and strategic concerns. This is supported by studies done by Spekman et al., (2002) and Prajogo and Olhager (2012) that successful supply chain management has been linked to communication frequency and quality (e.g. information flows reflected in the quality of information shared and the amount of information).

According to Christopher (2000) and Paulraj et al., (2008) shared information between supply chain partners can only be fully leveraged through process integration. Process integration means collaborative work between buyers and suppliers, joint product development, common systems, and shared information. This form of cooperation in the supply chain is becoming ever more prevalent, as organisations focus on managing their core competencies and outsource all other activities. In summary, as organisations face the challenge of providing goods in new world, a greater reliance on suppliers and alliance partners becomes inevitable. Along with process integration comes joint strategy determination, buyer-supplier teams and transparency of information. This makes frequent information exchange with supply chain partners, and keeping them informed of changes made, is essential in developing a successful supply chain relationship (Cao & Zhang, 2011).

In a high technology-usage industry – such as electrical and electronics - it is expected to find supply chain relationships are built to enable transfer of knowledge and/or technology via information among supply chain partners. High-technology firms find knowledge transfer essential by virtue of the fast-paced, highly uncertain nature of their industry (Hagedoorn, 1993). Effective management of information/knowledge transferred can be viewed as the process capability that potentially imparts a competitive advantage to the member of the supply chain. This view is supported by Spekman et al., (2002) that mention in integrated supply chains and, for all that matter, in all forms of alliances - the ability to absorb and transfer knowledge affords advantages which exceed any result from cost savings alone.

The second significant factor of process capability is innovation which, is measured by two items. First is innovation as corporate culture, and secondly constant development of innovative capability. Further to the explanation in Section 3.4.3.2, innovation may be linked to performance and growth through improvements in efficiency, productivity, quality, competitive positioning and market share. Organisations which do not innovate may be destroyed by those that do. The result of SEM analysis suggested that joint innovation between MNCs and SMEs influence the supply chain relationship, and consequently, supply chain agility practices.

This study found that both MNCs and SMEs emphasise constant innovation as part of their corporate culture. Further to the description of innovation in section 3.4.3.2, constant innovation is essential for organisations to be successful, and stay ahead than competitors. Rapid changes in technology and globalisation of products and services have resulted in more dynamic markets and greater uncertainty in customer demand. Customers are better informed, have greater access to a wider choice of goods and services, and have access to new products emerging at a faster pace. This has significant implications for organisational culture and operations, and its influence on the value of relationships between buyers and sellers (Wuyts & Geyskens, 2005). Organisational culture is defined as the values that senior managers in a firm share regarding appropriate business practices in the supply chain (Nooteboom et al., 1997). Organisational culture has typically been conceptualised as a molar concept that is indicative of the organisation's goals and appropriate means to goal attainment.

The findings revealed that to compete in the responsive market, both MNCs and SMEs have included in their organisation’s policy to constantly develop innovative capability. Competing in agile environments requires organisations to develop innovation capabilities to sustain superior organisational performance in an open economy, and globally dispersed sources of invention, innovation and manufacturing capability. According to Cox (1999) for any company or entrepreneur to be successful, there must be an understanding of how to achieve innovations in supply in such a way that the innovation achieves three desired outcomes. First, the innovation must close the contested horizontal marketplace to the innovator's current or potential direct competitors. Secondly, it must ensure that there is no threat of forward or backward integration from customers or suppliers. Finally, the innovation should not take place within a supply chain environment in which the appropriation of value flows not to the original innovator, but to some other player in the chain who possesses superior supply chain resources. With constant innovation, both MNCs and SMEs may capture sufficient value to deliver superior long-term supply chain agility practices.

The third significant factor of process capability which has a positive impact on supply chain agility practices is flexibility proficiency. This factor was measured using two validated scales. first is the ability to produce a range of products for different types of customers (Das, 2011). Second is the ability to increase new product development (Droge et al., 2004; Wong et al., 2011).

To become more responsive to the needs of the market requires more than speed. It also requires a high level of manoeuvrability that today has come to be termed agility. A key characteristic of an agile organisation is flexibility (Christopher, 2000; Christopher & Towill, 2002; Vinodh et al., 2012) . Flexibility is needed in the supply chain to counter the ambiguity in the decision parameters. A supply chain adapts to the changes if it is flexible and agile in nature. The origins of agility as a business concept lie partially in flexible manufacturing systems. Initially, it was thought that the route to manufacturing flexibility was through automation, to enable rapid change (i.e., reduced set-up times) and, thus, a greater responsiveness to changes in product mix or volume (Agarwal et al., 2006).

The findings revealed the ability of MNCs and SMES to produce a range of products for different types of customers may contribute significantly to their supply chain agility practices. Organisations are constantly paying attention in responding to the customer demand for maintaining a competitive advantage over their rivals. Getting the right product at the right time to the right customer is not only the prerequisite to competitive success, but also the key to survival. Customer satisfaction and marketplace understanding are critical elements for consideration when attempting to establish a new supply-chain strategy (Agarwal et al., 2006) . With flexible manufacturing systems MNCs and SMEs are capable of customising their products and responding to market sensitivity which involves issues related to quick response to customer's quickly-changing preferences. MNCs and SMEs are developing their capabilities to allow customers to customise a desired product from ranges of products that they produce.

Success in high-technology industries such as electronics, computers, aerospace, biotechnology, chemicals, and pharmaceuticals is contingent on effective development of new products (Maidique & Zirger, 1984). By increasing the number of new products introduced each year, MNCs and SMEs in this study are able to cope with new market competition which results in increased supply chain agility practices. This shows that process capability of both organisations is proficient in adapting to the market changes and capable of reaping the new market.

New product development and customisation discussed above are the new product perspectives which organisations try to accomplish; not the best optimal product or product line, but maximising the fit with customer needs, with no risk of over-stocks (Wind & Mahajan, 1997; Schilling & Hill, 1998; Ogawa & Piller, 2006). These capabilities of MNCs and SMEs perhaps offer additional flexibility to minimise the risks of product development, such as product failure due to rapid market and technological changes. Therefore, the objectives of increasing new product development, product customisation, reducing manufacturing lead-time and acting promptly to changes in customer requirements may be achieved through the dynamic process capability of organisations.

7.6 The Impact of Supply Chain Agility Practices on Supply Chain Operational Performance

This thesis hypothesised that supply chain agility practices is important to impact on organisational performance, and aims to examine whether there is a significant positive effect on supply chain operational performance. The proposed model hypothesised that supply chain agility practices have significant positive effects on supply chain operational performance. Therefore the fourth hypothesis proposed in this study was:

H4: Supply chain agility practices have a significant positive effect on supply chain operational performance.

This research conceptualises and develops four validated measurement items of supply chain agility practices. The results of the SEM analyses provide strong support for hypothesis four (H4) of this study. The results concede that increased supply chain agility practices improve supply chain operational performance. These four items were able to explain a significant portion of the variance in the supply chain agility practices. Certainly this is a powerful indication of the effect of supply chain agility practices on supply chain operational performance. The findings suggested by accomplishing the four measurement items of agility practices, MNCs and SMEs may improve their operational performance in the supply chain measured by delivery and order-cycle time performance, and accuracy in forecasting and order processing.

The supply chain is a network of facilities linking each element from customer and supplier through manufacturing and services so that the flow of material, money and information can be effectively managed to meet the business requirements (Taylor, 2004; Gibson et al., 2005; Hugos, 2006). Most organisations realise that in order to evolve an efficient and effective supply chain, supply chain management needs to be assessed for its performance (Gunasekaran et al., 2001). Through strategic relationships with partners in the supply chain, organisations may receive benefits existing for successfully implemented supply chains. These benefits are viewed from the relationships level; dyad relationships between MNCs and SMEs. The relationship developed between the two organisations may be designed to leverage the strategic and operational capabilities of individual participating organisations to assist them achieve significant ongoing benefits (Stuart, 1997; Monczka et al., 1998; Gunasekaran et al., 2004; Li et al., 2006).

This study reveals that by increasing supply chain agility practices with alliance partners, organisations may improve their delivery performance, order-cycle time, forecasting accuracy and order-processing accuracy. Realising the potential of supply chain management, organisations should focus the insights for the development of effective performance measures and metrics needed to achieve fully-integrated agile supply chains. Cost efficiency is not only the focus, but the importance of operation-management practices demonstrates the importance of strategy to determine organisational operational performance (Skinner, 1969; Song & Di Benedetto, 2008; Kickul et al., 2011).

The results of SEM findings proposed agile supply chain measures tested for improving supply-chain operational performance were:

i. the organisation's capacity to increase frequencies of new product introductions;
ii. the organisation's ability to increase levels of product customisation;
iii. manufacturing technologies to reduce our manufacturing lead-time; and
iv. acting promptly on changes in customers requirement.

This indicates MNCs and SMEs in this study implement SCM practices, which significantly improve their operational performance. This also implies that the range of products produced by organisations act as important strategic performance metrics (Gunasekaran et al., 2001; Tran et al., 2011) and may improve the organisation's supply chain operational performance, as justified in this study (Kisperska-Moron & de Haan, 2011). On the other hand, manufacturing processes through technology also has a major impact on operational performance. These impacts include product cost, quality, speed of delivery, and on-delivery reliability and flexibility (Mapes et al., 1997; Inman et al., 2011).

The results provide strong support that the operational performance of MNCs and SMEs in this study improved as they increased their capacity to increase frequencies of new product introduction and levels of product customisation. One explanation of this is introduction of new products provides opportunities for the introduction of new technology. Meanwhile, the operating methods require organisations to improve their delivery performance, order-cycle time, order-processing accuracy, and increase forecasting accuracy in order to fulfil changing expectations from different groups of customers. By the same token, organisations need to properly execute their manufacturing processes for them to manage the impact of product variety on cost, quality consistency, lead time and delivery reliability.

According to Fisher (1997), the selection of the right supply chain strategy depends upon the nature of product variety and innovation. This also implies that the range of products and services act as important strategic metrics, and hence should be considered in performance evaluation. The performance of production level measures and metrics, evaluation of planned order procedures, and measures for customer service and satisfaction are important measures, which each organisation needs to capitalise on supply chain capabilities and resources to bring products and services to the market faster and at the best overall value (Gunasekaran et al., 2001). This could be true, as organisational performance is usually influenced by many factors, and it is difficult to see whether any one factor will dominantly determine the overall operational performance. This indicates that in supply chain agility performance, agile supply chain practices have been mostly linked directly to operational performance in this study.

Therefore, the objectives of speed of delivery and accurate forecasting can be achieved through dynamic agility performance of organisations.

7.7 The Impact of Supply Chain Agility Practices on Supply Chain Financial Performance

This section explains the results of testing the hypotheses related to the relationships between supply chain agility practices and supply chain financial performance. The proposed model hypothesised that increased agility practices in the dyad improves supply chain financial performance. Therefore the fifth hypothesis proposed was:

H5: Supply chain agility practices have a significant positive effect on supply chain financial performance

The results of the SEM analyses provide strong support for hypothesis five (H5). It can be concluded that increased supply chain agility practices improves supply chain financial performance. Four validated metrics of supply chain agility practices explained in Section 4.7.2 were able to explain a significant portion of the variance in the supply chain agility performance. Certainly this is a dominant indication of the effect of supply chain agility practices on supply chain financial performance. The results conclude that with increased supply chain agility practices in the dyad, improved supply chain financial performance of both MNCs and SMEs in this study. The results also evidence that agility practices directly predicts financial performance.

According to Yamin et al., (1999) organisational performance refers to how well an organisation achieves its market-oriented goals, as well as its financial goals. The short-term objectives of SCM are primarily to increase productivity and reduce inventory and cycle time, while long-term objectives are to increase market share and profits for all members of the supply chain (Banfield, 1999). Further Holmberg (2000) mentioned that financial metrics have served as a tool for comparing organisations and evaluating an organisation's behaviour over time. This financial performance of a supply chain can be assessed by determining the total manufacturing cost. Any organisational initiative - including supply-chain management - should ultimately lead to enhanced organisational financial performance (Li et al., 2006).

A number of prior studies have measured organisational performance using both financial and market criteria, including return on investment (ROI), market share, profit margin on sales, the growth of ROI, the growth of sales, the growth of market share, and overall competitive position (Vickery et al., 1999). The findings of this study support the view that supply chain agility practices achieved from the strategic relationship between MNCs and SMEs can have discernible impact on the organisation’s financial performance. It should be noted that supply chain agility performance may be influenced by contextual factors, such as the type of supply chain and product produced. For example in this study, the more new products have been introduced, and higher levels of product customisation by strategic relationships between MNCs and SMEs, they may be able to become the market leader and reap greater market share than their competitors. Furthermore, their manufacturing technologies may reduce the manufacturing lead-time, which then enables to compete on meeting delivery speed and schedules. The link in a supply chain that directly deals with customers is the delivery of goods and services which is called the “driver of customer satisfaction” (Stewart, 1995).

In conclusion, improved relationships between MNCs and SMEs through complemented resources and capabilities will exceed the risk that they will share the knowledge to satisfy the customers with prompt action to changes in customer requirements. Therefore, this study has evidenced that good supply chain relationships between MNCs and SMEs enable both parties to produce better products, at a lower cost, with improved features, which in turn drives financial performance associated with an improved product launch. Thus, the objectives of improving profitability, market share and sales growth of the organisation can be achieved through dynamic agility practices of the organisation.

7.8 The Impact of Supply Chain Operational Performance on Supply Chain Financial Performance

This section explains the results of testing the hypotheses related to the relationships between supply chain operational performance and supply chain financial performance. The proposed model hypothesised that increased supply chain operational performance in the dyad improves financial performance of the supply chain. Therefore the sixth hypothesis proposed was:

H6: Supply chain operational performance has a significant positive effect on supply chain financial performance

The results of the SEM analyses found an insignificant relationship between operational performance and financial performance (profitability, market share and sales growth). The findings did not support hypothesis six (H6), and the notion that operational performance can drive superior financial performance. Therefore, it is concluded that increased supply chain operational performance does not improve supply chain financial performance. Four validated measurement items of supply chain operational practices were unable to explain a significant portion of the variance in the supply chain operational performance. Certainly this is an indication of the effect of supply chain operational performance on supply chain financial performance. The results conclude that increased supply chain operational performance in the dyad does not improve supply-chain financial performance of both MNCs and SMEs in this study. The results also evidence that operational performance does not directly predict financial performance of the organisation.

Many organisations have realised the importance of non-financial performance and financial performance measures. However, they have failed to understand them in a balanced framework. While some managers and researchers have concentrated on financial performance measures, others have concentrated on operational measures (Kaplan & Norton, 1992). Such inequality does not lead to metrics which can present a clear picture of the organisation’s performance in an agile environment. As suggested by Maskell (1991), for a balanced approach, organisations should bear in mind that, while financial performance measurements are important for strategic decisions and external reporting, day-to-day control of manufacturing and distribution operations is better handled with non-financial measures. This study however managed to investigate the link between operational measures and financial performance for organisations which adopt agile supply chains.

At an operational level, the benefit of developing collaborative relationships with members in the supply chain comes in the form of improved quality or delivery service, reduced cost, or some combination thereof. At a strategic level, it should lead to sustainable improvements in product quality and innovation, enhanced competitiveness, and increased market share. These should in turn be reflected by improvements in financial performance. The results of this study however, did not find a significant relationship between operational performance and financial performance. These findings did not support the notion that the operational performance in agile environments can drive superior financial performance, or even create competitive edge-generating competencies for organisations, as argued by Hayes and Pisano (1996) and Ketokivi and Schroeder (2004).

Several reasons can possibly explain for these findings. Firstly, the impact of this operational performance may be dependent on the development of more complex capability, and not simply the result of practice adoption, as suggested by authors (Powell, 1995; Tan et al., 2007). Some interactions between industries and practices proved to be significant. Although no clear pattern could be identified, this suggests that the impact of operational practices on financial performance may be dependent on context (Duarte et al., 2011). This operational performance would constitute the practices that under the agile supply chain strategy could promote competitive advantage. It is inherently difficult to measure how financial performance can be attributed to specific initiatives and actions, in particular to individual measurement of operational performance. Besides, the number of operational practices used may be limited. Quite often organisations have a large number of performance measures, to which they keep on adding based on suggestions from supply chain partners.

The operational metrics adopted by MNCs and SMEs are the best performing operational performance as far as delivery performance, reduced order cycle time, accuracy in forecasting and order processing are concerned, in line with the type of supply chain for innovative products. However, participating organisations are aware that by implementing these agility strategies, it may result in higher operational costs. For example, to expedite delivery of products, organisations may have to bear extra delivery costs, which would add to the total manufacturing cost and then transferred to the end user.

Further to this, in agile environments, there are unprecedented pressures on organisations to improve their operational efficiency for enhanced competitiveness and overall business performance. Such pressures may include new product introduction by competitors, falling product lifecycles, unanticipated customer shifts, and advances in manufacturing and information technology (Browne et al., 1995).

Consumer sophistication and the emergence of intelligent products have led to more difficult design specifications and expectations on deliverable value-added (Bhattacharya et al., 1996). Consistent with this, it is not an easy task to act upon pressures without incurring additional operational cost. Improving delivery performance for example will involve various factors such as vehicle speed, driver reliability, frequency of delivery, and location of depots (Gunasekaran et al., 2001). Increased effectiveness in these areas may well lead to an increase in total distribution costs (for example, the optimal number of depots that correspond to the overall cost incurred).

On the other hand, according to Beamon and Chen (2001), the single largest cost component of logistics is transportation cost, often comprising hold of the logistics costs. Rushton and Oxley (1991) show how trucking cost is always the highest among all costs of total distribution cost. Thus, in a strategy to minimise delivery cost and to improve quality, agile supply chains may not be the highest in desirability indices among other types of supply chains (Agarwal et al., 2006). Here it is pertinent to mention that in the uncertain environments, desired supply chain performance cannot be achieved by operational performances from agile supply chain practices alone.

Overall, the findings revealed that only five hypotheses are accepted, and concluded that:

1. Partner's characteristics capability has a significant positive effect on supply chain agility practices (H1).
2. Alliance management capability has a significant positive effect on supply chain agility practices (H2).
3. Process capability has a significant positive effect on supply chain agility practices (H3).
4. Supply chain agility practices have a significant positive effect on supply chain operational performance (H4).
5. Supply chain agility practices have a significant positive effect on supply chain financial performance (H5).

From the multigroup analysis, the study found no significant difference between MNCs and SMEs responses. This indicates that both MNCs and SMEs agree that the three identified antecedents of supply chain relationships (partner's characteristics capability, alliance management capability and process capability) have significant positive effects on supply chain agility practices. Improving the identified antecedents of supply chain relationships may increase the supply chain agility practices in the dyad, thus improving their operational and financial performance.

MNCs however, strongly emphasised partner's characteristics capability, followed by process and alliance management capability. Meanwhile, SMEs highlighted process capability has the strongest influence on supply chain agility practices compared to partner's characteristics and alliance management capability. As this study aims to identify antecedents of supply chain relationships between MNCs and SMEs, organisations may need to focus on enhancing partner's characteristics capability, alliance management capability and process capability as their significant resources and capabilities for improving their relationships with partners in the supply chain and their organisational performance.

The findings however, do not support the notion that supply chain operational performance has a significant positive effect on supply chain financial performance. Therefore Hypothesis 6 (H6) is rejected and concluded that in agile environments, increasing supply chain operational performance may increase the operational costs of the organisations. This will impact the bottom line of the organisations.

7.9 Summary

The main objective of this study is to examine the relationship between organisational resources and capabilities such as partner's characteristics capability, alliance capability and process capability on supply chain agility practices. In addition, it aims to discover the impact of supply chain agility practices on operational and financial performance. At the same time, the impact of operational performance on financial performance is also studied. The data analysis process using SEM confirms the widely held belief that organisational resources and capabilities is one of the major predictors for supply chain relationships' performance in agile environments. Partner's characteristics, alliance management and process capabilities are seen to be important resources and capabilities which organisations need to nurture for successful working supply chain relationship within the efficient supply chains.

Table 7.2 summarizes the measurement items of partner's characteristics capability, alliance management capability and process capability, which organisations should further strengthen as to add value to the organisation's resources and capabilities, and increase the alliance practices with members in the supply chain.

Table 7-2: Summary of Measurement Items Based on the Findings

Factors	Measurement Item
Partners' Compatibility	• Similar values and norms with partners • Compatible organisation's goals and objectives with partners
Resources Complementarities	• Complemented knowledge of customers with partners • Complemented channels of distribution with partners • Complemented links with major buyers with partners • Complemented industry knowledge with partners
Cooperation	• Share operational information with partners • Look for new ways to do business with partners • Makes strategic decisions in consultation with partners
Conflict Management	• Develop explicit mechanism to resolve conflict (s) • Undertake joint problem solving with partner • Encourages employees to be culturally sensitive
Information Technology	• Exchange of information takes place frequently, informally in a timely manner • Keep partners informed of changes that may affect decisions
Innovation	• Emphasizes on constant innovation as corporate culture • Constantly develop innovative capability as organisation's policy
Flexibility Proficiency	• Able to produce a range of products for different types of customers • Increase the number of new products introduced each year to cope with market competition

In an uncertain environment, good relationships may perhaps assist collaborating partners to effectively implement agility practices which benefit both the suppliers and buyers in the supply chain. This supply chain agility may effect positively to the operational and financial performance of the participating organisations. However, competing in agile supply chains may not necessary end with positive remarks on financial performance. Improving operational performance to satisfy unexpected customers' demands may require additional operational costs, which would affect the bottom line of the organisation. Thus operational performance may not necessarily contribute to increased financial performance in agile environments.

The next chapter will identify the final conclusions from the hypotheses, research framework and research problems. The next chapter will also draw the implications for both practice and theory; discuss the limitations of this study; describe the directions for future research; and identify the final conclusions.

CHAPTER EIGHT

CONCLUSIONS, IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH

8.1 Introduction

This study focuses on supply chain relationships in an agile environment. It attempts to determine critical antecedents of supply chain relationships between MNCs and SMEs in the Malaysian electrical and electronics industry, examining their impact on supply chain agility practices and organisational performance. The objectives of this chapter are to summarise the conclusion and contributions from the research findings, and to highlight the possible important implications for theory and management to improve the effectiveness of supply chain relationships in the context of the agile environment. Further, this chapter discusses the recommendations for researchers, policymakers and practitioners, who are interested in the development of organisational capabilities within firms in the future.

This final chapter starts with Section 8.1 introducing the objectives of this chapter, followed by the conclusions and contributions based on the conceptual framework, methodology and measurement, and research question in Section 8.2. The theoretical and managerial implications of the research findings are deliberated in Section 8.3. Section 8.4 draws the limitation of this research, and directions for future research are described in Section 8.5. This chapter is concluded by overall summary in Section 8.6.

8.2 Conclusions and Contributions from Research Findings

This section discusses the conclusions and contributions from the findings into three major perspectives: research framework, empirical methodology and measurement, and research problem.

8.2.1 Conclusions and Contributions Based on the Research Framework

This study involves an empirical investigation of the supply chain relationship in the context of agile environments. This encapsulates theoretical reasoning from two theories in a new research setting. The central research question underpinning this study is: What are the antecedents of supply chain relationship in an agile environment? To address this research question and achieve the research objective, a comprehensive review of potential theories and theoretical literature was conducted, and all relevant directions towards identifying the predictors of supply chain relationships are consolidated in Chapter 3.

The basic objective of this research is to develop a research framework showing possible antecedents of supply chain relationships, and their impact on supply chain agility practices. Figure 8-1 display the final research framework of supply chain relationship model.

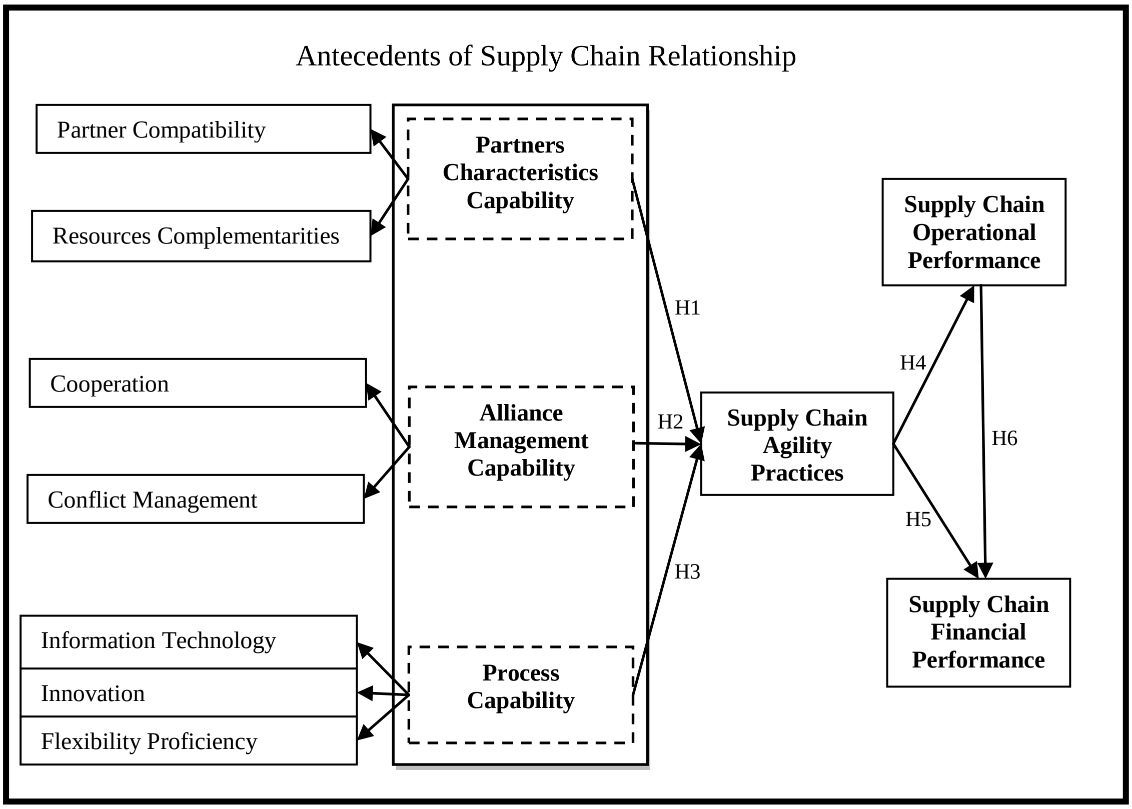


Figure 8-1: Final Supply Chain Relationship Model

This first analysis section of this study has attempted to empirically investigate the relationship between three major exogenous variables; partner characteristics capability (PCC), alliance management capability (AMC) and process capability (PC) with an endogenous variable, being supply chain agility practices. In relation, three hypotheses were developed to determine the relationships between each of the supply chain relationship antecedents identified with the endogenous variable, being supply chain agility practices.

Given the importance of the relationship between the variables of supply chain relationship, it was found that all of the hypotheses were supported, broadly indicating that antecedents of supply chain relationships – such as partner's characteristics capability (PCC), alliance management capability (AMC) and process capability (PC) – are significant positively related to the agility practices of an organisation, the endogenous variable of this study. The analysis in Chapter 6 confirmed the higher-order constructs involved in the research framework.

The research framework was composed of three second-order exogenous constructs; PCC, AMC and PC, and one endogenous construct, being supply chain agility practices (SCAP). These constructs were validated as multidimensional, consisting of the two first-order constructs of PCC (partner compatibility and resources complementarities); two first-order constructs of AMC (cooperation and conflict management); and three first-order constructs of PC (information technology capability, innovation capability and flexibility proficiency). This type of higher-order construct has been analysed infrequently in many studies, which allows a significant contribution by analysing the dimensionality and relationship between first-order and second-order constructs.

The study also contributes to the body of knowledge by presenting the supply chain relationships model from dyadic perspectives. The questionnaires were collected from both samples of MNCs and SMEs prior to analysis using multigroup analysis. This study might be the first empirical research that focuses on supply chain relationships between MNCs and SMEs in the Malaysian electrical and electronics industry from the dyadic perspective.

The third significant contribution is related to the examination of supply chain relationship constructs. Initial first-order constructs of the variables were pre-tested using survey questionnaires, and analysed using analytical hierarchical process (AHP) to recognise critical antecedents of supply chain relationships in the practical world. The analysis resulted in the deletion of insignificant factors, to create a new research model of supply chain relationships. This new supply chain relationship model was tested using structural equation modelling (SEM) and the final hypothesised structural model (see Section 6.6.5) discovered that partner's characteristics capability (PCC) directly influenced supply chain agility practices (SCAP) through its first-order exogenous constructs; partner compatibility and resources complementarities. From the analysis, increased partner characteristics capability in the dyad would increase supply chain agility practices.

The analysis in Chapter 6 confirmed that it is apparent in agile environments; partner's characteristics capability has the strongest influence on supply chain agility practices. As described in Section 7.3, in responding quickly to the responsive market, organisations may emphasise partners which are well-suited to them. Based on the literature, organisations may also form strategic alliances with organisations in the supply chain, the resources of which complemented their existing available resources. Forming strategic alliances has become one of the most common means of entering new international markets.

Despite the popularity of MNCs, however, a significant number of alliances fail. Approximately 50-60% of alliances formed are unsuccessful in accomplishing the partner's objectives (Dacin et al., 1997). Besides the inherent risk, one of the most cited reasons for alliance failure is the incompatibility of partners. The choice of the right partner can yield important competitive benefits, whereas the failure to establish compatible objectives, or communicate effectively, can lead to insuperable problems. Furthermore, the need to understand both partners' similarities and differences is paramount in ensuring the success of alliances.

This study also revealed process capability as the second highest-rated quality, by the respondents, in the standardised estimates result (refer Table 5.26). The final hypothesised structural model (Figure 6.11) discovered that in an agile environment, process capability (PC) directly influences supply chain agility practices (SCAP) through the information technology capability, innovation capability, and flexibility proficiency measurement items. The results show that process capability has a significant positive relationship with supply chain agility performance. This relationship was discussed in Section 7.5 of previous chapter: in agile environments, the buyer (MNCs) and supplier (SMEs) may need to find effective responses to a constantly changing and highly competitive business environment. Both organisations must acquire process capability in order to be able to react to possible volatile fluctuations in demand.

As hypothesised, the study found a weak significant positive relationship between alliance management capability (AMC) and supply chain agility practices (SCAP). Section 7.4 of Chapter 7 discusses the effect of cooperation and conflict management on alliance practices. To succeed in the new economy, large organisations have turned to global sourcing strategies as well as balancing the opportunities coming from globalised markets by partnering with local enterprises. In this study, relationships developed between large organisations (MNCs) and local partners (SMEs) evolve from competitive to cooperative relationships. Relationships between supply chain partners may also need to be managed for the alliance to work successfully. This is to avoid potential conflict arising between two different entities, which may discourage the efficiency of the agility practices.

The fourth significant contribution is related to the multigroup path analysis performed to strengthen the supply chain relationship model proposed between MNCs and SMEs in agile environments. The analysis was performed to identify significant differences between the two groups. Multigroup analysis proved that there is no significant difference between findings from path analysis tested on combined samples of MNCs and SMEs. Both MNCs and SMEs have similarity in terms of their views and opinions about the antecedents of supply chain relationships, their effect on alliance practices, and operational and financial performance. However, comparing findings from the structural path models with a standardised path coefficient between MNCs and SMEs (see Figure 6-12 and Figure 6-13). MNC respondents gave the highest weight for partners' characteristics capability (PCC), while SMEs gave the highest weight to process capability. This may give the perception that when forming alliances with SMEs in developing countries, MNCs in Malaysian electrical and electronics industries focus on alliance partners that understand their objectives as well as criteria used by their partners in selecting collaborators. By contrast, SMEs may prefer to work with MNCs equipped with proficient process capability.

The second analysis section of this study has attempted to empirically investigate between supply chain agility practices (SCAP) as the exogenous variable and two major endogenous variables: supply chain operational performance (SCOP) and supply chain financial performance (SCFP). The study also developed another hypothesis to determine the relationships between SCOP and SCFP. The findings discussed in Chapter 7 provide evidence of the most important contribution to the current study.

The findings showed that relationships of SCAP with SCOP and SCAP with SCFP were significant positively related. However the relationship between SCOP and SCFP was not significant. These findings were comparable to those studies that focused on the effect of supply chain operational practices on organisational performance. This finding is a new discovery in the study of agile supply chains, as this study may be the first study that attempted to examine the impact of non-financial performance metrics (SCOP) on financial performance metrics (SCFP) in the context of agile supply chains in Malaysian electrical and electronics industries.

These results provided the basis for further study to carefully examine the existence and dimensionality of the constructs of interest, including re-assessment of suitability of the measurement items of each construct. Further study is suggested to examine other SCAP and SCOP measurement items beneficial and meaningful when organisations implement them, in responsive market conditions. The re-examination also needs to be particularly focused on other industries besides electricity and electronics.

Remarkably, although the analysis of SCAP on SCOP and SCFP was conducted along two different paths, it ultimately merged into a literature body with a common goal of improving organisational performance throughout the value chain. No previous studies had been conducted to examine these relationships. Thus the findings of the current study constitute a major contribution to new knowledge, as they present further evidence for organisations seeking to improve their operational and financial performance in agile context.

Another interesting finding from the second analysis was the insignificant relationship between SCOP and SCFP. The findings disclose empirically that in agile environments, operational performance does not impact the financial performance of an organisation. As discussed in Section 7.8, the findings pointed out the necessity for organisations to consider development of other operational practices, as increased supply chain operational performance in the dyad will not improve supply chain financial performance. This is particularly important, as these findings are new, moreover, they are among the first to come from an examination of RBV and ERBV theories, specifically in a developing economy, such as Malaysia.

It is indispensable for organisations, both SMEs and MNCs in Malaysian electrical and electronics industry to recognise critical operational factors which may not contribute to financial performance. Perhaps in agile environments, organisations may need to balance the performance measures (non-financial and financial metrics) and consider the application of strategies besides agile supply chains. Agility is needed in less predictable environments, where demand is volatile and the requirement for variety is high (Lee, 2002). Lean, however works best in high-volume, low-variety and predictable environments. Meanwhile "leagility" is the combination of the lean and agile paradigms within a total supply chain strategy. This combination works by positioning the de-coupling point so as to best suit the need for responding to a volatile demand downstream, yet providing level scheduling upstream from the de-coupling point (Naylor et al., 1999; Bruce et al., 2004). For that reason, organisations may not only focus on one specific supply chain strategy, but to examine the best strategy which suits their manufacturing environment.

This study also took one step from previous studies by proposing the examination of RBV. Theory in supply chain relationships from two different perspectives; firstly a developing country (which is Malaysia) and secondly the organisations selected, both from MNCs and SMEs. This study has also provided new knowledge by proposing a few new findings as discussed above, related to the mutual relationship of PCC, AMC and PC on the relationship between supply chain agility practices and business performance; supply chain agility practices on organisational performance; and the effect of operational performance on organisational financial performance.

8.2.2 Conclusions and Contributions Based on the Empirical Methodology and Measurement

This study is based on quantitative research methodology. The data analysis of the study required a range of basic and advanced statistical techniques to solve research problems. The current study provides a significant contribution to empirical methodology and measurement through the use of analytical hierarchy process (AHP) for the pilot study and structural equation modelling (SEM) from the AMOS software. The AHP was chosen, as it is a multi-criteria decision-making problem which includes identifying critical or important factors. The SEM technique was chosen however, due to its superiority to other conventional statistical techniques, and because it employs a unique combination of two multivariate techniques; factor analysis and multiple regression analysis (Hair et al., 2010).

SEM was used in the study to test the interrelationships between the constructs of interest, because it provides explicit estimates of the error variance parameters, which is not implemented in other conventional statistical techniques, to counter model imperfections. As indicated in Section 5.3, two types of error variance occur: measurement errors associated with observed variables, and residual term (disturbance term), which are designed to account for unexplained variance in the latent variables. SEM also provides more precise analysis of factor reliability, or composite reliability. As discussed in Section 5.3.7, composite reliability includes measurement errors of the indicators, and consequently provides more accurate construct reliability output. Meanwhile, Cronbach's Alpha is considered error-free during value calculation, distorting the accuracy of the theorised model to a particular extent.

SEM permits the concurrent statistical estimation of both indicators and latent variables, and makes testing a hypothesis easier and more precise than conventional statistical techniques. The findings of this study provide additional understanding of the theories underlying PCC, AMC and PC implications of the antecedents of supply chain relationships on supply chain agility practices, and of the organisational performance.

For example, the comprehensive assessment of confirmatory factor analysis (CFA) was accomplished through SEM to validate the unidimensionality of the second-order constructs of PCC, AMC and PC, supply chain agility practices and organisational performance. The study also contributes additional knowledge on the impact of operational performance on supply-chain financial performance. The use of SEM contributed to the study by allowing the easy and extensive modelling of multivariate interrelations and allowing the output of the current study to be analysed and interpreted more precisely and rationally, and thus provide the new insights to the body of knowledge.

The findings of this study are more precise than those of previous studies (Carr & Smeltzer, 2002; Humphreys et al., 2004), as all errors were included in the assessment of confirmatory factor analysis (CFA) and in the second-order construct analysis. It is also different to the conventional statistical technique, which could only develop the analysis indicators as a reflection from the first-order constructs (partner compatibility, resources complementarities, cooperation, conflict management, information technology, innovation and flexibility proficiency). This different analysis shows the contribution of this study to the body of knowledge, by taking into account the analysis related to second-order constructs for the seven constructs of interest, and simultaneously retaining the idiosyncratic nature of the first-order constructs.

This study also makes a significant contribution to the empirical methodology and measurement by analysing the data collected from two different groups - MNCs and SMEs – through SEM multigroup analysis. This study is one of the pioneers which explore the complex analysis to determine any variance between the two groups. Prior to SEM multigroup analysis, all constructs of interests were analysed using multigroup confirmatory analysis and path analysis to examine the similarity in pattern of structural relationships hypothesised for the combined samples; MNCs and SMEs. This type of analysis could not have been accomplished by conventional methods such as multiple regression analysis, which cannot examine different groups simultaneously.

8.2.3 Conclusions and Contributions Based on the Research Question

This study has defined a broad research question at the beginning of the thesis based on extensive literature review. The broad research question stated in Chapter 1 is:

> *"What are the critical antecedents of supply-chain relationships between multinational corporations (MNCs) and small and medium enterprises (SMEs) in Malaysian electrical and electronics supply chains and their impact on alliance practices and performance?"*

Several specific research questions were established from the broad research question.

Research Question 1: What are the antecedents of supply chain relationships?

Question 1 attempts to determine antecedents of supply chain relationships in agile environments. This question has been attained through extensive review of literature discussed in Chapter 3. From a resource based view (RBV) perspective, a feasible strategic alliance between buyer and supplier in the supply chain may require organisations to develop their internal resources and capabilities such as partner's characteristics capability (PCC), alliance management capability (AMC) and process capability (PC) as the antecedents of supply chain relationships in an agile environment.

PCC is represented by partner's compatibility and resources complementarities; AMC is measured by cooperation and conflict management; and process capability is signified with information technology, innovation and flexibility proficiency. Measurement items were adapted from previous studies to reflect every factor of interest before they were validated using SEM.

Research Question 2: Is there any relationship between partner's characteristics capability (PCC), alliance management capability (AMC) and process capability (PC) with supply chain alliance practices.

Question 2 is the core research question that is aligned with the research objective statement. It intends to empirically examine the impact of these antecedents of supply chain relationships on supply chain alliance practices. Three hypotheses (H1, H2 and H3) were designed to answer this question. The results of the hypothesis testing – as discussed in Chapter 6 - concluded that the three identified antecedents of supply chain relationships are significantly and positively related to supply chain alliance practices. Therefore, it can be concluded from the analysis that, increase in PCC, AMC and PC would increase supply chain alliance practices respectively. However, based on the results of the final hypothesised model (see Section 6.6.5), PCC has the strongest significant relationships with alliance practices, followed by PC and AMC. In building workable supply chain relationships, organisations may perhaps emphasise fundamental requirements – such as compatibility with partners and resources complementarities –

before seeking the process capability of their partners. On the other hand, AMC is seen as the strategy to manage alliances to avoid unexpected or potential alliance risk.

Research Question 3: What is the impact of supply chain alliance practices on organisational performance?

Question 3 and its two hypotheses (H4 and H5) were designed to comprehend further the extent and magnitude of supply chain alliance practices on operational performance and financial performance. It is further concluded in relation to the secondary research questions stated in Section 1.3, that the application of structural equation modelling reveals the significant and positive impact of supply chain alliance practices on supply chain operational and financial performance outcomes so mentioned.

In Hypothesis 4 (H4), supply chain alliance practices (SCAP) have a significant positive relationship with supply chain operational performance. The findings can be concluded that increased supply chain agility practices in the relationships may improve the organisation supply chain's operational performance. By increasing alliance practices such as capacity to increase frequencies of new product introductions, levels of product customization, manufacturing technologies and prompt action on changes to customer requirements may improve organisations' operational performance. Operational performance in this study is being measured by improving delivery performance, order-cycle times, forecast accuracy and order processing accuracy.

In Hypothesis 5, there is also a significant positive relationship between supply chain alliance practices with supply chain financial performance. The findings can be concluded that increased supply chain agility practices in the relationship may improve the organisation supply chain's financial performance. Financial performance in this study is measured by profitability, market share and sales growth of the organisation.

As noted earlier based on z-value in Table 6.27, the effect of supply chain agility practices on operational performance is greater than on financial performance. It is important to note that the alliance practices account for a significant proportion of the variance in performance metrics. The implication is both significant and of potential importance to organisations seeking to build workable relationships with partners in the supply chain

Research Question 4: Is there any relationship between supply chain operational performance and supply chain financial performance?

Research Question 4 addresses the impact of supply chain operational performance on financial performance. The findings found that in agile environments, supply chain operational performance does not significantly impact on the supply chain financial performance. The structural model developed for Chapter 6 takes these key findings and captures them in a way that can be dynamically demonstrated. It can be concluded that increases supply chain operational performance may not improve organisation's financial performance.

One important caveat to the above conclusions however must be made. The practicability of an organisation in the electrical and electronics industry depends largely on how well it is capable of responding to volatile market changes and customer requirements, while becoming agile. It is becoming increasingly difficult and less economical for organisations to produce their needs on their own. Instead, collaborative partnerships should become one of their main strategies. As explained in Section 7.8, it is proven that operational strategies developed for agile supply chains do not improve organisational financial performance in agile environments. From a competitive-advantage perspective, organisations in the electrical and electronics industries in Malaysia should perhaps identify differentiating strategies, and should not limit themselves to agile supply chain strategies but instead explore and adopt strategies from lean or “leagile” supply chain for improving their financial performance. In other words, the results reinforce the importance of a balanced approach to managing supply chain activities.

8.3 Implications of Research Findings

Following the discussion on conclusions and contribution, this section discusses the implications of this study from two major perspectives: theoretical implications and managerial implications.

8.3.1 Theoretical Implications

The concept of collaboration, what it means, and how it can best be applied, has been a focal point of research both in general management and SCM research (Heiman & Nickerson, 2002). More specifically, the potential for collaboration to be used as a specific competitive strategy goes back some years ago in general management review (Thorelli, 1986), as well as in the domain of SCM research (Bowersox, 1990). This literature shows that the pursuit of collaboration between supply chain partners is due to the growing complexity of business, combined with resource limitation (Lambert et al., 1999; Cao & Zhang, 2011).

In essence, theoretical developments describing the underpinned arguments in the literature have provided impetus for investigating the antecedents of supply chain relationships in an agile environment. By combining the theoretical approach from extant theories, a new theoretical supply chain relationship model has been developed and tested. The result suggests that contemplated enmeshed antecedents are no doubt important to enhance the buyer and supplier relationship. From an agile environment perspective in a developing country, this study makes an absolute contribution to enrich the current published literature and body of knowledge by presenting the significant issues relating to antecedents of supply chain relationships from resource-based view (RBV) and extended resource-based view (ERBV) theories; partner characteristics capability (PCC), alliance management capability (AMC) and process capability (PC); and their impact on supply chain agility practices.

This study was extended to investigation on the effect of agility practices on organisational performance. Further it demonstrates a strong relationship between supply chain agility practices and organisational performance. As noted earlier, the effect of agility practices on operational performance is greater than financial performance. The implication is both significant and of potential importance to organisations seeking to improve their operational performance, while focusing on managing relationships with partners in the supply chain.

The most surprising result of this study was the insignificant relationship between supply chain operational performance and supply chain financial performance. Operational performance measures in this study did not contribute to improved financial performance. By contrast, reducing operational cost is the organisation's tactical strategy to improve the bottom-line result. The results reinforce the importance of a balanced approach to managing supply chain activities. Thus, this study highlights the need to assess other operational performance measures besides focusing on individual measures aiming at reducing cost. The practitioners may gain additional insight as well as direction in the academic body of knowledge, which is rooted in the buyer and supplier relationship adopting agile supply chain strategies. The vast majority of conceptual arguments for these theoretical arguments achieved empirical validation through this study, which should be of interest to academic practitioners.

From the perspective in developing economy, this study makes an unquestionable contribution to the literature. This study might be the first empirical research which focuses on such issues in the Malaysian electrical and electronics context. As in the quantitative approach, this study empirically examined from a dyadic perspective, gathering information from both the buyers (MNCs) and suppliers (SMEs) in the selected industries. The results and analysis further imply that all of the identified antecedents of supply chain relationships extended the directions of use of two basic theories in a new research setting. This study is concluded with the proposition of factors that contribute to strategic collaborative alliances that have been built between MNCs and SMEs in the Malaysian electrical and electronics industry.

This study makes significant contributions to the field of supply chain management – specifically the buyer-and-supplier relationship literature – by systematically determining the critical antecedents of supply chain relationships from the resource-based view and extended resource-based view theories, and examining the impact of these antecedents on supply chain alliance practices. At this point, the study extended to examine the effect of supply chain alliance practices on operational and financial performance. Overall, the results provide support for both the identified basic theories, and show that appropriate organisational resources and capabilities as identified in this study can significantly enhance supply chain alliance practices. Improvement in organisational resources and capabilities – such as partner's characteristics, alliance management and process capability - may improve supply chain agility practices, thus improving organisational operational and financial performance.

As a summary, this study reveals that organisational resources and capabilities can be conceptualised by partners' characteristics capability (PCC), alliance management capability (AMC) and process capability (PC), and these resources and capabilities are important factors for the establishment of a supply chain relationship, due to the highly volatile market which requires strategic collaboration with partners in the supply chain. Established buyer and supplier relationships are proven to increase alliance practices in the supply chain, which leads to improved organisational performance.

8.3.2 Managerial Implications

The primary intention of this study is to produce results which are relevant to and practical for organisations in the electrical and electronics industry. The findings of this study indicate that antecedents of supply chain relationships among supply chain partners are important drivers to increase alliance practices in an agile environment. In particular, the model tested in this study indicates that organisations need to enhance their resources and capabilities such as partner characteristics, alliance management and process capability, as they will be best served by focusing on their combined relationship with partners in the supply chain.

Although some organisations have realised the importance of implementing supply chain management practice, they often do not know exactly what to implement to develop long-term, mutually-beneficial relationships with suppliers or buyers in the supply chain. This is due to lack of understanding of what constitutes a comprehensive set of supply chain relationships. The present study validates antecedents of supply chain relationships from the resource-based view and extended resource-based view theories. By proposing, developing, and validating a multi–dimensional, operational measure of the supply chain relationship antecedents from both the selected theories, and by demonstrating their impact in enhancing organisational performance, the present study provides managers in the field with the useful tool for evaluating the comprehensiveness of their current organisational resources and capabilities.

The managerial implication largely emerged from quantitative findings in terms of which antecedents are significant in a buyer and supplier relationship in agile environments, and how to maximise the agility practices in the dyad. In terms of the quantitative analysis, the findings suggest that partner's characteristics capability and process capability based on organisational resources and capabilities are strong predictors of supply chain relationships in agile environment. Alliance management capability is a weak predictor, yet requires attention. Both buyers and suppliers need to heighten these resources and capabilities which captivate their business partner's intention to build a collaborative strategic alliance.

This study is important because it is the first empirical research to establish a relationship between antecedents of supply chain relationships developed from the resource-based view and extended resource-based view theories, supply chain alliance practices and organisations' operational and financial performance, using structural equation modelling. Therefore, this research fills the gap between theory and practice concerning strategically managed supply chain relationships using an organisation's resources and capabilities. The implications of this study are also important through the results suggesting that organisations can increase their alliance practices and improve organisational performance through increased emphasis of strategically managing their own resources and capabilities. As such, the primary implications for managers are threefold:

i. to develop and heighten organisations' strategic partner's characteristics, process capability and alliance management capability;
ii. to integrate all the resources and capabilities with alliance partners as elaborated by the extended resource-based view theory; and

iii. to optimise agility practices with partners which sustain the organisations performance.

From a practical perspective, the analysis reveals that placing emphasis on strategic relationships can benefit organisations within the supply chain, whether they are the buyer or supplier. Emphasising the strategic relationship means that the organisation recognises the importance of complemented resources and capabilities of the organisation’s partners to increase the alliance strategic and operational supply chain practices. For many managers, it will be necessary to begin the process of developing the relationship by examining the resources and capabilities of their partners to match with theirs, according to a long-range plan of building a mutually-beneficial relationship. To accomplish this task, managers must first understand the resource-based approach and emphasis on the significant relationship constructs derived from the research findings. In sum, managers must continuously review their organisation’s resources and capabilities to ensure they aligned with their partner’s aptitudes. Compatible strategic planning among partners would result in efficient implementation of alliance practices, which anticipate improved organisational performance.

However, the analysis reveals that increases in operational performance will not improve the organisational financial performance. This indicates that increasing operational performance in an agile environment would result in increasing operational cost, thus impacting the bottom line of the organisation. Equally important, the findings reveal a strong interest in operational performance metrics, which suggest the need for a broad base of relevant strategic operational measures. Organisations which pursue balanced supply chain strategies with key partners can anticipate some improvement in their organisation's financial performance. This study allows managers to understand different operational performance measures and strategies to adopt for high-technological industry, such as the electrical and electronics industry.

This study makes a significant contribution by providing a framework for decision making. Many organisations implement collaboration based on intuition, executive judgement and competitive and customer pressure. By doing so, it could well be that organisations are focusing on aspects that may not be so important, whilst those aspects that may need to be strengthened could possibly be ignored. The model presented in this study provides a validated model that can guide the actions of practitioners in terms of elements to emphasise in building a workable supply chain relationship.

8.4 Limitations of the Research

Part of the strength of any research project is to recognise its limitations (Dolen et al., 2004). While this study makes contributions to the body of supply chain relationship literature, it has some limitations that must be addressed. These are discussed below in terms of the context of this study, the research setting, the data collection methodology, the constructs' measures and analytical technique used to perform the analysis (Structural Equation Modelling).

Firstly, the sample chosen for this study focuses on supply chain relationships in one single industry in Malaysia. It may raise concern about limited external validity and could limit the potential of the findings to be more generally applied. Constraining the study to a single industry eliminates problems associated with the effects of industry differences (Hartline & Ferrell, 1996), but future research will have to reveal whether the results are applicable to other settings. Though a single industry (electricity and electronics) study in Malaysia allows the researcher to control complex market variables that may be different from industry to industry, or country to country, the applicability to other industries or countries may be limited. On the other hand, the respondents' companies represented a small sample size, which may affect the stability of the parameter estimates. This necessitates replication of the proposed supply chain relationships model in contrasting empirical contexts. Thus, empirical findings should be interpreted with caution. Realising these limitations, future studies should collect data from a larger population and compare with other countries with MSC zones to further validate or extend the theoretical constructs identified in this study.

Secondly, both of the perspectives on relationship's performance dynamics are incomplete, as this research employed a cross-sectional snapshot of the phenomenon. The research was not able to draw causal inferences because of the undertaken cross-sectional nature of data. This gap can be remedied by examining the linkage between antecedents of supply chain relationships and supply chain agility practices in a longitudinal setting, using supply-chain relationships in agile environments as the proposed model. Longitudinal data are needed for studying causations.

Thirdly, limitations need to be addressed in regard to the supply chain relationship constructs developed for this study. Using Resource-based view (RBV) and Extended Resource-based View (ERBV) theories, antecedents of supply chain relationships were adapted from previous studies; therefore exploratory factor analysis (EFA) was not performed for the analysis. This study is theory-confirming, rather than theory-testing. Thus, new theory on supply chain relationships in agile environments may also be tested using new constructs of supply chain relationships explored from qualitative methodology, such as interviews with industry practitioners. The methodology employed may also be extended to a mixed method, which includes both qualitative and quantitative methods of study.

8.5 Directions for Future Research

Although this study has developed a model that provides an effective supply chain relationship model with identified critical antecedents, several areas for future research remain. The current research endeavour focused on electrical and electronics producers within Multimedia Super Corridor Zones in a developing economy, being Malaysia. The findings could be different with other country classification groups considered, such as under-developing countries and developed countries. Several opportunities for future research spring from the results of this study. It would be interesting to extend this research to other developed or developing countries, which offer attractive remunerations and incentives for foreign investment. This suggests a need for more cross-boundary research to identify whether electrical and electronics manufacturers consider the same supply-chain relationship antecedents. Future research should also explore and compare the antecedents of supply chain relationships in other countries, such as China, India, Singapore and Taiwan/Chinese Taipei.

Future researchers are encouraged to explore whether the proposed supply chain relationship model of this study holds in other industry contexts. As was discussed in Chapter 3, the antecedents of supply chain relationships were identified for agile supply chains suitable for innovative products, such as electrical and electronics products in Malaysia. Therefore, the implications might show differences in contexts where the identified antecedents are tested on industries with the adoption of lean or “leagile” supply chains.

On theory application, future research may also explore the knowledge-management and theoretical perspective, focusing on inter-organisational learning and knowledge-sharing for supply chain relationships practice diffusion. The development of scales that are capable of measuring the various competitive dimensions of value, rarity, inimitability, and non-substitutability are still in need of development for supply chain relationships in an agile environment.

From a cultural perspective, the variable of culture can be added to the model. With data from individualistic and collectivistic cultures, an assessment of culture can be undertaken. For example, I n building strategic alliances with organisations from different countries, is culture a moderating or influential factor to forming long-term mutual agreements. The majority of the MNC respondents in the current study were from the countries such as United States.

Referring to the insignificant relationship between supply chain operational performance and financial performance, future research may perhaps consider measures which better reflect the operational performance of the organisations in the context of agile supply chains. Similarly, to further refine the dimensions of operational performance in agile environments would help to clarify the conceptualisation. Performance measurement is an ongoing process, and the instrument can be strengthened through a series of further refinements, such as measurements of supply chain practices, operational performance, and financial performance, and test across different populations and settings. These would provide the decision-maker more effective measures to monitor the performance of the supply chain in an agile environment.

8.6 Summary

Managing relationships in the supply chain is important for any business firm in an agile environment. The findings of this research suggest that strategic relationships in an agile environment can be developed from organisation's resources and capabilities, such as the partner characteristics capability, alliance management capability and process capability. A new supply chain relationship model is developed, where it contributes to the existing body of knowledge from the conceptual framework, methodology and measurement, and research question.

Theoretical and managerial implications are discussed, to give a transparent picture from the findings on the importance of partner's characteristics, alliance management and process capability to the implementation of alliance practices between members in the supply chain. However, this study acknowledges some limitations that would provide opportunities for further research.

References

Abdullah, MA & Baker, MI (eds) 2000, *Small and Medium Enterprises in Asian Pacific Countries: Roles and Issues*, Nova Science Publishers, Huntington, New York.

Acquaah, M 2009, 'International Joint Venture Partner Origin, Strategic Choice, and Performance: A Comparative Analysis in an Emerging Economy in Africa', *Journal of International Management*, vol. 15, no. 1, pp. 46-60.

Agarwal, A, Shankar, R & Tiwari, MK 2006, 'Modeling the Metrics of Lean, Agile and Leagile Supply Chain: An Anp-Based Approach', *European Journal of Operational Research*, vol. 173, no. 1, pp. 211-25.

Agus, A 2001, 'A Linear Structural Modelling of Total Quality Management Practices in Manufacturing Companies in Malaysia', *Total Quality Management*, vol. 12, no. 5, pp. 561-73.

Ahmad, MFB & Yusof, SrM 2010, 'Comparative Study of Tqm Practices between Japanese and Non-Japanese Electrical and Electronics Companies in Malaysia: Survey Results', *Total Quality Management & Business Excellence*, vol. 21, no. 1, pp. 11-20.

Akaike, H 1973, *Information Theory and an Extension of the Maximum Likelihood Principle*, 2nd International Symposium on Information Theory (Pp. 267-281), Akademiai Kiado, Budapest.

Akaike, H 1987, 'Factor Analysis and Aic', *Psychometrika*, vol. 52, no. 3, pp. 317-32.

Al-Khalifa, AK & Peterson, SE 1999, 'The Partner Selection Process in International Joint Venture', *European Journal of Marketing*, vol. 33, no. 11/12, pp. 1064-81.

Albers, S & Klaas-Wissing, T 2012, 'Organisation of Multilateral Ltl Alliances', *International Journal of Logistics Research and Applications*, vol. 15, no. 3, pp. 181-98.

Amabile, TM, Conti, R, Coon, H, Lazenby, J & Herron, M 1996, 'Assessing the Work Environment for Creativity', *The Academy of Management Journal*, vol. 39, no. 5, pp. 1154-84.

Amaratunga, D, Baldry, D, Sarshar, M & Newton, R 2002, 'Quantitative and Qualitative Research in the Built Environment: Application of “Mixed” Research Approach', *Work Study*, vol. 51, no. 1, pp. 17 - 31.

Andersen, PH, Christensen, PR & Damgaard, T 2009, 'Diverging Expectations in Buyer-Seller Relationships: Institutional Contexts and Relationship Norms', *Industrial Marketing Management*, vol. 38, no. 7, pp. 814-24.

Anderson, J & Gerbing, D 1984, 'The Effect of Sampling Error on Convergence, Improper Solutions, and Goodness-of-Fit Indices for Maximum Likelihood Confirmatory Factor Analysis', *Psychometrika*, vol. 49, no. 2, pp. 155-73.

Anderson, JC & Gerbing, DW 1982, 'Some Methods for Respecifying Measurement Models to Obtain Unidimensional Construct Measurement', *Journal of Marketing Research*, vol. 19, no. 4, pp. 453-60.

Anderson, JC & Gerbing, DW 1988, 'Structural Equation Modelling in Practice: A Review and Recommended Two Steps Approach', *Psychological Bulletin*, vol. 10, pp. 411-23.

Anderson, JC & Narus, JA 1990, 'A Model of Distributor Firm and Manufacturer Firm Working Partnerships', *Journal of Marketing*, vol. 54, no. 1, pp. 42-58.

Angeles, R & Nath, R 2001, 'Partner Congruence in Electronic Data Interchange (Edi)-Enabled Relationships', *Journal of Business Logistics*, vol. 22, no. 2, pp. 109-27.

Annonymous 2001, *Telecommunication and Information Group Report*, Ministry of Communications Brunei Darussalam.

Arbuckle, JL 2005, *Amos 6.0 User Guide*, Amos Development Corporation, Spring House, U.S.A.

Armstrong, JS & Overton, TS 1977, 'Estimating Nonresponse Bias in Mail Surveys', *Journal of Marketing Research*, vol. 14, pp. 396-402.

Arya, B & Zhiang Lin 2007, 'Understanding Collaboration Outcomes from an Extended Resource-Based View Perspective: The Roles of Organizational Characteristics, Partner Attributes, and Network Structures†', *Journal of Management*, vol. 33, no. 5, pp. 697-723.

Austin, J 2010, 'From Organization to Organization: On Creating Value', *Journal of Business Ethics*, vol. 94, no. 1, pp. 13-5.

Bagozzi, R 1980, *Causal Models in Marketing*, John Wiley, New York.

Bagozzi, R & Yi, Y 1988, 'On the Evaluation of Structural Equation Models', *Journal of the Academy of Marketing Science*, vol. 16, no. 1, pp. 74-94.

Bagozzi, RP 1981, 'Evaluating Structural Equation Models with Unobservable Variables and Measurement Error: A Comment', *Journal of Marketing Research*, vol. 18, no. 3, pp. 375-81.

Bai, J & Ng, S 2005, 'Tests for Skewness, Kurtosis, and Normality for Time Series Data', *Journal of Business & Economic Statistics*, vol. 23, no. 1, pp. 49-60.

Baker, P 2008, 'The Design and Operation of Distribution Centres within Agile Supply Chains', *International Journal of Production Economics*, vol. 111, pp. 27-41.

Banfield, E 1999, *Harnessing Value in the Supplychain*, Wiley, New York.

Barney, J, Wright, M & Ketchen, DJ 2001, 'The Resource-Based View of the Firm: Ten Years after 1991', *Journal of Management*, vol. 27, no. 6, pp. 625-41.

Barney, JB 1991, 'Firm Resources and Sustained Competitive Advantage', *Journal of Management*, vol. 11, pp. 791 - 800.

Barney, JB 2000, 'Firm Resources and Sustained Competitive Advantage', *Advances in Strategic Management*, vol. Volume 17, pp. 203-27.

Barratt, M 2004, 'Understanding the Meaning of Collaboration in the Supply Chain', *International Journal of Supply Chain Management*, vol. 9, no. 1, pp. 30-42.

Baumgartner, H & Homburg, C 1996, 'Applications of Structural Equation Modeling in Marketing and Consumer Research: A Review', *International Journal of Research in Marketing*, vol. 13, no. 2, pp. 139-61.

Beamon, BM & Chen, VCP 2001, 'Performance Analysis of Conjoined Supply Chains', *International Journal of Production Research*, vol. 39, no. 14, pp. 3195-218.

Bearden, WO, Sharma, S & Teel, JE 1982, 'Sample Size Effects on Chi Square and Other Statistics Used in Evaluating Causal Models', *Journal of Marketing Research*, vol. 19, no. 4, pp. 425-30.

Bell, MP 2012, *Diversity in Organization*, South-Western Cengage Learning, Ohio, USA.

Bello, DC, Lohtia, R & Dant, SP 1999, 'Collaborative Relationships for Component Development: The Role of Strategic Issues, Production Costs, and Transaction Costs', *Journal of Business Research*, vol. 45, no. 1, pp. 15-31.

Bensaou, M 1999, 'Portfolios of Buyer-Supplier Relationships. (Cover Story)', *Sloan Management Review*, vol. 40, no. 4, pp. 35-44.

Bentler, PM 1990, 'Comparative Fit Indexes in Structural Models', *Psychological Bulletin*, vol. 107, no. 2, pp. 238 - 46.

Bentler, PM & Bonett, DG 1980, 'Significance Tests and Goodness of Fit in the Analysis of Covariance Structures', *Psychological Bulletin*, vol. 88, no. 3, pp. 588 - 606.

Bentler, PM & Chow, C-P 1987, 'Practical Issues in Structural Modeling', *Sociological Methods & Research*, vol. 16, no. 1, pp. 78-117.

Bernama 2012, 'Malaysia's Ict Industry to Cross Rm10 Billion Spending Mark by Next Year'.

Beske, P 2012, 'Dynamic Capabilities and Sustainable Supply Chain Management', *International Journal of Physical Distribution & Logistics Management*, vol. 42, no. 4, pp. 372 - 87.

Betts, T & Tadisina, SK 2009, 'Supply Chain Agility, Collaboration, and Performance: How Do They Relate?', paper presented to POMS 20th Annual Conference, Orlando, Florida U.S.A, May 1 to May 4, 2009

Bhattacharya, AK, Jina, J & Walton, AD 1996, 'Product Market, Turbulence and Time Compression: Three Dimensions of an Integrated Approach to Manufacturing System Design', *International Journal of Operations & Production Management*, vol. 16, no. 9, pp. 34 - 47.

BNM 2006, *Annual Survey of Manufacturing Industry 2006*, Kuala Lumpur.

Bollen, KA 1989, 'A New Incremental Fit Index for General Structural Equation Models', *Sociological Methods & Research*, vol. 17, no. 3, pp. 303 - 16.

Bollen, KA 1989, *Structural Equations with Latent Variables*, Wiley, New York.

Bollen, KA & Long, JS 1993, *Testing Structural Equation Models*, Sage Publication, Califonia.

Bourne, M, Mills, J, Wilcox, M, Neely, A & Platts, K 2000, 'Designing, Implementing and Updating Performance Measurement Systems', *International Journal of Operations & Production Management*, vol. 20, no. 7, pp. 754 - 71.

Bowersox, DJ 1990, 'The Strategic Benefits of Logistics Alliances', *Harvard Business Review*, no. July - August, pp. 36 - 45.

Boyer, KK & Lewis, MW 2002, 'Competitive Priorities: Investigating the Need for Trade-Offs in Operations Strategy', *Production and Operations Management*, vol. 11, no. 1, pp. 9-20.

Branco, M & Rodrigues, L 2006, 'Corporate Social Responsibility and Resource-Based Perspectives', *Journal of Business Ethics*, vol. 69, no. 2, pp. 111-32.

Bretherton, P & Chaston, I 2005, 'Resource Dependency and Sme Strategy: An Empirical Study', *Journal of Small Business and Enterprise Development*, vol. 12, no. 2, pp. 274 - 89.

Brouthers, KD, Brouthers, LE & Wilkinson, TJ 1995, 'Strategic Alliances: Choose Your Partners', *Long Range Planning*, vol. 28, no. 3, pp. 18-25.

Brown, MW & Cudeck, R 1993, 'Alternative Ways of Assessing Model', in KA Bollen & JS Long (eds), *Testing Structural Equation Models*, Sage, Newbury Park, CA, pp. 136 -62.

Brown, S 1993, '"Drop and Collect Surveys: A Neglected Research Technique?"', *Marketing Intelligence & Planning*, vol. 5, no. 1, pp. 19-23.

Browne, J, Sackett, J & Wortmann, J 1995, 'Future Manufacturing Systems—Towards the Extended Enterprise', *Computers in Industry*, vol. 25, pp. 235 - 54.

Browne, MW & Cuddeck, R 1992, 'Alternative Ways of Assessing Model Fit', *Sociological Methods & Research*, vol. 21, no. 2, pp. 230-58.

Browne, MW, MacCallum, RC, Kim, C-T, Andersen, BL & Glaser, R 2002, 'When Fit Indices and Residuals Are Incompatible', *Psychological Methods*, vol. 7, no. 4, pp. 403 - 21.

Bruce, M, Daly, L & Towers, N 2004, 'Lean or Agile: A Solution for Supply Chain Management in the Textiles and Clothing Industry?', *International Journal of Operations & Production Management*, vol. 24, no. 2, pp. 151 - 70.

Bryman, A & Bell, E 2007, *Business Research Methods*, Oxford University Press, New York.

Burgers, WP, Hill, CWL & Kim, WC 1993, 'A Theory of Global Strategic Alliances: The Case of the Global Auto Industry', *Strategic Management Journal*, vol. 14, no. 6, pp. 419-32.

Burgess, K, Singh, PJ & Koroglu, R 2006, 'Supply Chain Management: A Structured Review and Implications for Future Research', *International Journal of Operations and Production Management*, vol. 26, no. 7, pp. 703-29.

Byrne, BM 1989, *A Primer of Lisrel: Basic Applications and Programming for Confirmatory Factor Analytic Models*, Springer-Verlag Publishing, New York, US.

Byrne, BM 2001, *Structural Equation Modeling with Amos: Basic Concepts, Applications, and Programming*, Lawrence Erlbaum Associates:London

Byrne, BM 2010, *Structural Equation Modeling with Amos : Basic Concepts, Applications, and Programming* 2nd edn, Routledge Taylor and Francis Group, New York

Cagliano, R, Caniato, F & Spina, G 2004, 'Lean, Agile and Traditional Supply: How Do They Impact Manufacturing Performance?', *Journal of Purchasing and Supply Management*, vol. 10, no. 4-5, pp. 151-64.

Cagliano, R, Caniato, F & Spina, G 2006, 'The Linkage between Supply Chain Integration and Manufacturing Improvement Programmes', *International Journal of Operations & Production Management*, vol. 26, no. 3, pp. 282 - 99.

Cambra-Fierro, J, Florin, J, Perez, L & Whitelock, J 2011, 'Inter-Firm Market Orientation as Antecedent of Knowledge Transfer, Innovation and Value Creation in Networks', *Management Decision*, vol. 49, no. 3, pp. 444-67.

Caniato, F, Golini, R & Kalchschmidt, M 2012, 'The Effect of Global Supply Chain Configuration on the Relationship between Supply Chain Improvement Programs and Performance', *International Journal of Production Economics*, no. 0.

Cao, M & Zhang, Q 2011, 'Supply Chain Collaboration: Impact on Collaborative Advantage and Firm Performance', *Journal of Operations Management*, vol. 29, no. 3, pp. 163-80.

Carmines, E & McIver, J 1981, 'Analyzing Models with Unobserved Variables: Analysis of Covariance Structures', in *Social Measurement: Current Issues* Sage Publications, Inc, Beverly Hills, pp. 65 - 115.

Carr, AS & Pearson, JN 1999, 'Strategically Managed Buyer–Supplier Relationships and Performance Outcomes', *Journal of Operations Management*, vol. 17, no. 5, pp. 497-519.

Carr, AS & Smeltzer, LR 2002, 'The Relationship between Information Technology Use and Buyer-Supplier Relationships: An Exploratory Analysis of the Buying Firm's Perspective', *Engineering Management, IEEE Transactions on*, vol. 49, no. 3, pp. 293-304.

Cavana, R, Delahaye, BL & Sekeran, U 2001, *Applied Business Research: Qualitative and Quantitative Methods*, John Wiley & Sons Australia, Milton, Queensland.

Cavusgil, ST & Deligonul, S 2012, 'Exogenous Risk Analysis in Global Supplier Networks: Conceptualization and Field Research Findings', *Information, Knowledge, Systems Management*, vol. 11, no. 1, pp. 131-49.

Chan, FTS & Zhang, T 2011, 'The Impact of Collaborative Transportation Management on Supply Chain Performance: A Simulation Approach', *Expert Systems with Applications*, vol. 38, no. 3, pp. 2319-29.

Chau, PYK & Hu, PJ-H 2001, 'Information Technology Acceptance by Individual Professionals: A Model Comparison Approach*', *Decision Sciences*, vol. 32, no. 4, pp. 699-719.

Chemers, MM, Costanzo, MA & Oskamp, S 1995, *Diversity in Organizations:New Perspectives for a Changing Workplace*, SAGE Publications, California, USA.

Chen, C-A, Lee, H-l & Wu, C-H 2012, 'How Taiwan's Semiconductor Distributors Select Strategic Partners in China', *Journal of Technology Management in China*, vol. 7, no. 1, pp. 36 - 49.

Chen, FF, Sousa, KH & West, SG 2005, 'Teacher's Corner: Testing Measurement Invariance of Second-Order Factor Models', *Structural Equation Modeling: A Multidisciplinary Journal*, vol. 12, no. 3, pp. 471-92.

Chen, H-h, Lee, P-y & Lay, T-j 2009, 'Drivers of Dynamic Learning and Dynamic Competitive Capabilities in International Strategic Alliances', *Journal of Business Research*, vol. 62, pp. 1289 - 95.

Chen, IJ & Paulraj, A 2004, 'Towards a Theory of Supply Chain Management: The Constructs and Measurements', *Journal of Operations Management*, vol. 22, no. 2, pp. 119-50.

Chen, S-H, Lee, H-T & Wu, Y-F 2008, 'Applying Anp Approach to Partner Selection for Strategic Alliance', *Management Decision*, vol. 46, no. 3, pp. 449 - 65.

Cheung, CC & Chuah, KB 1999, 'Conflict Management Styles in Hong Kong Industries', *International Journal of Project Management*, vol. 17, no. 6, pp. 393-9.

Cheung, GW & Rensvold, RB 2002, 'Evaluating Goodness-of-Fit Indexes for Testing Measurement Invariance', *Structural Equation Modeling: A Multidisciplinary Journal*, vol. 9, no. 2, pp. 233-55.

Cheung, M-S, Myers, MB & Mentzer, JT 2010, 'Does Relationship Learning Lead to Relationship Value? A Cross-National Supply Chain Investigation', *Journal of Operations Management*, vol. In Press, Corrected Proof.

Chiang, T-A & Trappey, AJC 2007, 'Development of Value Chain Collaboration Model for Product Lifecycle Management and Its Lcd Industry Adoption', *International Journal of Production Economics*, vol. 109, pp. 90-104.

Childerhouse, P, Aitken, J & Towill, DR 2002, 'Analysis and Design of Focused Demand Chains', *Journal of Operations Management*, vol. 20, no. 6, pp. 675-89.

Childerhouse, P & Towill, DR 2003, 'Simplified Material Flow Holds the Key to Supply Chain Integration', *Omega*, vol. 31, no. 1, pp. 17-27.

Chin, K-S, Tummala, VMR, Leung, JPF & Tang, X 2004, 'A Study on Supply Chain Management Practices: The Hong Kong Manufacturing Perspective', *International Journal of Physical Distribution & Logistics Management*, vol. 34, no. 6, pp. 505 - 24.

Cho, JJ-K, Ozment, J & Harry Sink 2008, 'Logistics Capability, Logistics Outsourcing and Firm Performance in an E-Commerce Market', *International Journal of Physical Distribution & Logistics Management*, vol. 38, no. 5, pp. 336 - 59.

Chopra, S & Meindl, P 2007, *Supply Chain Management:Strategy, Planning and Operations*, 3rd edn, Prentice Hall, Upper Saddle River, New Jersey.

Chopra, S & Sodhi, MS 2004, 'Managing Risk to Avoid Supply Chain Breakdown', *Sloan Management Review,*, no. Fall, pp. 53 - 6.

Christopher, M 2000, 'The Agile Supply Chain: Competing in Volatile Markets', *Industrial Marketing Management*, vol. 29, no. 1, pp. 37-44.

Christopher, M & Towill, D 2001, 'An Integrated Model for the Design of Agile Supply Chains', *International Journal of Physical Distribution and Logistics Management*, vol. 31, no. 4, pp. 235 - 46.

Christopher, M & Towill, DR 2002, 'Developing Market Specific Supply Chain Strategies', *International Journal of Logistics Management*, vol. 13, no. 1, p. 1.

Chung, S, Singh, H & Lee, K 2000, 'Complementarity, Status Similarity and Social Capital as Drivers of Alliance Formation', *Strategic Management Journal*, vol. 21, no. 1, pp. 1-22.

Churchill, GA 1979, 'A Paradigm for Developing Better Measures of Marketing Constructs', *Journal of Marketing Research*, vol. XVI, no. February 1979, pp. 64-73.

Clark, KB 1996, 'Competing through Manufacturing and the New Manufacturing Paradigm: Is Manufacturing Strategy Passe?', *Production and Operations Management*, vol. 5, no. 1, pp. 42-58.

Clarke, A 1999, *Evaluation Research: An Introduction to Principles, Methods and Practices* Sage Publication, Thousand Oaks, CA.

Cohen, JW 1988, *Satistical Power Analysis for the Behavioral Sciences* 2edn, NJ:Lawrence Erlbaum Associates, Hillsdale.

Conner, KR 1991, 'A Historical Comparison of Resource-Based Theory and Five Schools of Thought within Industrial Organization Economics: Do We Have a New Theory of the Firm?', *Journal of Management*, vol. 17, no. 1, pp. 121-54.

Cooley, WW 1978, 'Explanatory Observational Studies', *Educational Researcher*, vol. 7, no. 9, pp. 9-15.

Cooper, DR & Schindler, PS 2006, *Marketing Research*, McGraw-Hill, Boston.

Cooper, MC, Lambert, DM & Pagh, JD 1997, 'Supply Chain Management: More Than a New Name for Logistics', *The International Journal of Logistics Management*, vol. 8, no. 1, pp. 1 - 14.

Corsten, D & Felde, J 2005, 'Exploring the Performance Effects of Key-Supplier Collaboration: An Empirical Investigation into Swiss Buyer-Supplier Relationships', *International Journal of Physical Distribution & Logistics Management*, vol. 35, no. 6, pp. 445 - 61.

Cousins, PD 1999, 'Supply Base Rationalisation: Myth or Reality?', *European Journal of Purchasing & Supply Management*, vol. 5, no. 3-4, pp. 143-55.

Cousins, PD 2002, 'A Conceptual Model for Managing Long-Term Inter-Organisational Relationships', *European Journal of Purchasing & Supply Management*, vol. 8, no. 2, pp. 71-82.

Cousins, PD 2005, 'The Alignment of Appropriate Firm and Supply Strategies for Competitive Advantage', *International Journal of Operations & Production Management,*, vol. 25, no. 5, pp. 403 - 28.

Cousins, PD, Lawson, B & Squire, B 2008, 'Performance Measurement in Strategic Buyer-Supplier Relationships: The Mediating Role of Socialization Mechanisms', *International Journal of Operations & Production Management*, vol. 28, no. 3, pp. 238 - 58.

Cox, A 1999, 'Power, Value and Supply Chain Management', *Supply Chain Management: An International Journal,*, vol. 4, no. 4, pp. 167 - 75.

Coyle, G 2004, *Practical Strategy. Open Access Material. Ahp*, Pearson Education Limited.

Craighead, CW, Ketchen, DJ, Dunn, KS & Hult, GG 2011, 'Addressing Common Method Variance: Guidelines for Survey Research on Information Technology, Operations, and Supply Chain Management', *Engineering Management, IEEE Transactions on*, vol. 58, no. 3, pp. 578-88.

Creswell, JW 2009, *Research Design : Qualitative, Quantitative, and Mixed Methods Approaches*, 3 edn, Sage Publications Thousand Oaks, California.

Crook, TR & Combs, JG 2007, 'Sources and Consequences of Bargaining Power in Supply Chains', *Journal of Operations Management*, vol. 25, no. 2, pp. 546-55.

Crotts, JC & Turner, GB 1999, 'Determinants of Intra-Firm Trust in Buyer-Seller Relationships in the International Travel Trade', *International Journal of Contemporary Hospitality Management*, vol. 11, no. 2/3, pp. 116 - 23.

Cullen, JB, Johnson, JL & Sakano, T 2000, 'Success through Commitment and Trust: The Soft Side of Strategic Alliance Management', *Journal of World Business*, vol. 35, no. 3, pp. 223-40.

Dacin, MT, Hitt, MA & Levitas, E 1997, 'Selecting Partners for Successful International Alliances: Examination of U.S. And Korean Firms', *Journal of World Business*, vol. 32, no. 1, pp. 3-16.

Daft., RL 2010, *Organization Theory and Design*, 10th edn, South-Western Cengage Learning, Mason, Ohio.

Das, A, Narasimhan, R & Talluri, S 2006, 'Supplier Integration—Finding an Optimal Configuration', *Journal of Operations Management*, vol. 24, no. 5, pp. 563-82.

Das, K 2011, 'Integrating Effective Flexibility Measures into a Strategic Supply Chain Planning Model', *European Journal of Operational Research*, vol. 211, no. 1, pp. 170-83.

Das, TK & Teng, B-S 1998, 'Resource and Risk Management in the Strategic Alliance Making Process', *Journal of Management*, vol. 24, no. 1, pp. 21-42.

Das, TK & Teng, B-S 2000, 'A Resource-Based Theory of Strategic Alliances', *Journal of Management*, vol. 26, no. 1, pp. 31-61.

Das, TK & Teng, B-S 2000, 'A Resource-Based Theory of Strategic Alliances', *Journal of Management*, vol. 26, no. 1, pp. 31 - 61.

Das, TK & Teng, B-S 2001, 'A Risk Perception Model of Alliance Structuring', *Journal of International Management*, vol. 7, no. 1, pp. 1-29.

Das, TK & Teng, B-S 2003, 'Partner Analysis and Alliance Performance', *Scandinavian Journal of Management*, vol. 19, no. 3, pp. 279-308.

Davenport, TH 1998, 'Putting the Enterprise into the Enterprise System', *Harvard Business Review*, vol. July/August, no. 121 - 133.
Day, GS 1994, 'The Capabilities of Market-Driven Organizations', *Journal of Marketing*, vol. 58, no. 4, pp. 37-52.
De Toni, A & Tonchia, S 2005, 'Definitions and Linkages between Operational and Strategic Flexibilities', *Omega*, vol. 33, no. 6, pp. 525-40.
De Wulf, K, Odekerken-Schröder, G & Dawn, I 2001, 'Investments in Consumer Relationships: A Cross-Country and Cross-Industry Exploration', *Journal of Marketing*, vol. 65, no. 4, pp. 33-50.
Demirbag, M, Koh, SCL, Tatoglu, E & Zaim, S 2006, 'Tqm and Market Orientation's Impact on Smes' Performance', *Industrial Management & Data Systems*, vol. 106, no. 8, pp. 1206 - 28.
Devaraj, S, Krajewski, L & Wei, JC 2007, 'Impact of Ebusiness Technologies on Operational Performance: The Role of Production Information Integration in the Supply Chain', *Journal of Operations Management*, vol. 25, no. 6, pp. 1199-216.
DeVellis, RF 2012, *Scale Development : Theory and Applications*, Thousand Oaks, SAGE, California.
Diamantopoulos, A & Siguaw, JA 2000, *Introducing Lisrel*, Sage Publications, London.
DiStefano, C & Hess, B 2005, 'Using Confirmatory Factor Analysis for Construct Validation: An Empirical Review', *Journal of Psychoeducational Assessment*, vol. 23, no. 3, pp. 225-41.
Doh, JP 2000, 'Entrepreneurial Privatization Strategies: Order of Entry and Local Partner Collaboration as Sources of Competitive Advantage', *The Academy of Management Review*, vol. 25, no. 3, pp. 551-71.
Dolen, Wv, Ruyter, Kd & Lemmink, J 2004, 'An Empirical Assessment of the Inf Luence of Customer Emotions and Contact Employee Performance on Encounter and Relationship Satisfaction', *Journal of Business Research*, vol. 57, pp. 437 - 44.
Doz, YL 1996, 'The Evolution of Cooperation in Strategic Alliances: Initial Conditions or Learning Processes?', *Strategic Management Journal*, vol. 17, no. S1, pp. 55-83.
Droge, C, Jayaram, J & Vickery, SK 2004, 'The Effects of Internal Versus External Integration Practices on Time-Based Performance and Overall Firm Performance', *Journal of Operations Management*, vol. 22, no. 6, pp. 557-73.
Duarte, ALdCM, Brito, LAL, Di Serio, LC & Martins, GS 2011, 'Operational Practices and Financial Performance: An Empirical Analysis of Brazilian Manufacturing Companies', *BAR. Brazilian Administration Review*, vol. 8, pp. 395-411.
Duffy, R & Fearne, A 2004, 'Buyer-Supplier Relationships: An Investigation of Moderating Factors on the Development of Partnership Characteristics and Performance', *International Food and Agrobusiness Management Review*, vol. 27, no. 2, pp. 1-25.
Dull, SF, Morris, DN, Stephens, T & Wolfe, MT 2003, 'Customer Relationship Management Capabilities in a Supply Chain Context', in JL Gattorna (ed.), *Gower Handbook of Supply Chain Management*, 5 th edn, Gower Publishing, Burlington, USA.
Dwyer, FR, Schurr, PH & Oh, S 1987, 'Developing Buyer-Seller Relationships', *Journal of Marketing*, vol. 51, no. April 1987, pp. 11-27.

Dyer, JH & Singh, H 1998, 'The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage', *Academy of Management Review*, vol. 23, no. 4, pp. 660 - 79.

Eisenhardt, KM & Schoonhoven, CB 1996, 'Resource-Based View of Strategic Alliance Formation: Strategic and Social Effects in Entrepreneurial Firms', *Organization Science*, vol. March/April, no. 7, pp. 136 - 50.

Elmore, PE & Beggs, DL 1975, 'Salience of Concepts and Commitment to Extreme Judgements in Response Pattern of Teachers', *Education*, vol. 4, pp. 325-34.

Emory, WC 1985, *Business Research Methods*, Irwin, Homewood,IL.

EPU 2006, *Ninth Malaysia Plan 2006-2010*, Prime Minister's Department, Economic Planning Unit (EPU).

EPU 2010, *The Tenth Malaysian Plan: 2011 - 2015*, Economic Planning Unit, Prime Minister's Department Putrajaya, Malaysia.

Farrell, AM & Rudd, JM 2009, 'Factor Analysis and Discriminant Validity : A Brief Review of Some Practical Issues', paper presented to Australia-New Zealand Marketing Academy Conference (ANZMAC), Monash University, Melbourne.

Fawcett, SE, M.Magnan, G & Ogden, F 2007, *Achieving World-Class Supply Chain Collaboration: Managing the Transformation*, Institute for Supply Management.

Fawcett, SE & Magnan, GM 2002, 'The Rhetoric and Reality of Supply Chain Integration', *International Journal of Physical Distribution & Logistics Management*, vol. 32, no. 5, pp. 339 - 61.

Feng, B, Fan, Z-P & Li, Y 2011, 'A Decision Method for Supplier Selection in Multi-Service Outsourcing', *International Journal of Production Economics*, vol. 132, no. 2, pp. 240-50.

Ferdows, K & De Meyer, A 1990, 'Lasting Improvements in Manufacturing Performance: In Search of a New Theory', *Journal of Operations Management*, vol. 9, no. 2, pp. 168-84.

Fernández-Pérez, V, Fuentes-Fuentes, MdM & Bojica, A 2012, 'Strategic Flexibility and Change: The Impact of Social Networks', *Journal of Management & Organization*, vol. 18, no. 1, pp. 2-15.

Fisher, ML 1997, 'What Is the Right Supply Chain for Your Product?', *Harvard Business Review*, vol. 75, no. 2, p. 105.

Flint, DJ 2004, 'Strategic Marketing in Global Supply Chains: Four Challenges', *Industrial Marketing Management*, vol. 33, no. 1, pp. 45-50.

Flynn, BB & Flynn, EJ 2004, 'An Exploratory Study of the Nature of Cumulative Capabilities', *Journal of Operations Management*, vol. 22, no. 5, pp. 439-57.

Flynn, BB, Huo, B & Zhao, X 2010, 'The Impact of Supply Chain Integration on Performance: A Contingency and Configuration Approach', *Journal of Operations Management*, vol. 28, no. 1, pp. 58-71.

FMM 2008a, *Fmm-Directory 2008 Malaysian Industries - Supplying the World with Competitive Products and Services*, Federations of Malaysian Manufacturers, Kuala Lumpur.

FMM 2008b, *Fmm-Matrade Indusry Directory: Electrical and Electronics Malaysia*, Federation of Malaysian Manufacturers, Kuala Lumpur.

FMM 2012, *Fmm-Matrade Industry Directory*, Federation of Malaysian Manufacturer, Kuala Lumpur.

Fornell, C & Larcker, DF 1981, 'Evaluating Structural Equation Models with Unobservable Variables and Measurement Error', *Journal of Marketing Research*, vol. 18, no. 1, pp. 39-50.

Frohlich, MT & Westbrook, R 2001, 'Arcs of Integration: An International Study of Supply Chain Strategies', *Journal of Operations Management*, vol. 19, no. 2, pp. 185-200.

Fuente, MVdl, Ros, L & Cardós, M 2008, 'Integrating Forward and Reverse Supply Chains: Application to a Metal-Mechanic Company', *International Journal of Production Economics*, vol. 111, no. 2, pp. 782-92.

Gallagher, D, Ting, L & Palmer, A 2008, 'A Journey into the Unknown; Taking the Fear out of

Structural Equation Modeling with Aoms for the First-Time User', *The Marketing Review*, vol. 8, no. 3, pp. 255-27.

Garver, MS & Mentzer, JT 1999, 'Logistics Research Methods: Employing Structural Equation Modeling to Test for Construct Validity', *Journal of Business Logistics*, vol. 20, no. 1, pp. 33-87.

George, D & Mallery, P 1999, *Spss for Windows Step by Step: A Simple Guide and Reference*, Allyn & Bacon, Needham Heights, MA.

Gerbing, DW & Anderson, JC 1988, 'An Updated Paradigm for Scale Development Incorporating Unidimensionality and Its Assessment', *Journal of Marketing Research*, vol. 25, no. 2, pp. 186-92.

Gibson, BJ, Mentzer, JT & Cook, RL 2005, 'Supply Chain Management: The Pursuit of a Consensus Definition', *Journal of Business Logistics*, vol. 26, no. 2, pp. 17-25.

Goffin, K, Lemke, F & Szwejczewski, M 2006, 'An Exploratory Study of 'Close' Supplier-Manufacturer Relationships', *Journal of Operations Management*, vol. 24, no. 2, pp. 189-209.

Graziano, AM & Raulin, ML 2007, *Research Methods: A Process of Inquiry*, Pearson Education, Inc., Boston.

Grewal, R & Tansuhaj, P 2001, 'Building Organizational Capabilities for Managing Economic Crisis: The Role of Market Orientation and Strategic Flexibility', *Journal of Marketing*, vol. 65, no. 2, pp. 67-80.

Gripstrud, G, Jahre, M & Persson, G 2006, 'Supply Chain Management-Back to the Future?', *International Journal of Physical Distribution & Logistics Management*, vol. 36, no. 8.

Guan, J & Ma, N 2003, 'Innovative Capability and Export Performance of Chinese Firms', *Technovation*, vol. 23, no. 9, pp. 737-47.

Gulati, R, Nohria, N & Zaheer, A 2000, 'Guest Editors' Introduction to the Special Issue: Strategic Networks', *Strategic Management Journal*, vol. 21, no. 3, pp. 199-201.

Gulati, R, Nohria, N & Zaheer, A 2000, 'Strategic Networks', *Strategic Management Journal*, vol. 21, no. 3, pp. 203-15.

Gunasekaran, A 1999, 'Agile Manufacturing: A Framework for Research and Development', *International Journal of Production Economics*, vol. 62, no. 1-2, pp. 87-105.

Gunasekaran, A, Lai, K-h & Cheng, TCE 2008, 'Responsive Supply Chain: A Competitive Strategy in a Networked Economy', *The International Journal of Management Science*, vol. 36, pp. 549-64.

Gunasekaran, A & Ngai, EWT 2005, 'Build-to-Order Supply Chain Management: A Literature Review and Framework for Development', *Journal of Operations Management*, vol. 23, no. 5, pp. 423-51.
Gunasekaran, A, Patel, C & McGaughey, RE 2004, 'A Framework for Supply Chain Performance Measurement', *International Journal of Production Economics*, vol. 87, no. 3, pp. 333-47.
Gunasekaran, A, Patel, C & Tirtiroglu, E 2001, 'Performance Measures and Metrics in a Supply Chain Environment', *International Journal of Operations & Production Management*, vol. 21, no. 1/2, pp. 71 - 87.
Gunasekaran, A & Yusuf, YY 2002, 'Agile Manufacturing: A Taxonomy of Strategic and Technological Imperatives', *International Journal of Production Research*, vol. 40, no. 6, pp. 1357-85.
Hagedoorn, J 1993, 'Understanding the Rationale of Strategic Technology Partnering: Inter-Organizational Modes of Cooperation and Sectoral Differences', *Strategic Management Journal*, vol. 14, pp. 371 - 85.
Hagen, R 2002, 'Globalization, University Tranformation and Economic Regeneration: A Uk Case Study of Public/Private Sector Partnership', *The International Journal of Public Sector Management*, vol. 15, no. 3, pp. 204-18.
Hair, JF, Anderson, RE, Tatham, RL & Black, WC 1995, *Multivariate Data Analysis with Readings*, 4th edn, Englewood Cliffs
Hair, JF, Anderson, RE, Tatham, RL & Black, WC 1998, *Multivariate Data Analysis*, Fifth edn, Prentice-Hall International, Inc., Upper Saddle River, New Jersey.
Hair, JF, Bush, RP & Ortinau, DJ 2009, *Marketing Research: In a Digital Information Environment*, 4th edn, McGraw-Hill Irwin, Boston.
Hair, JFJ, Babin, B, Money, AH & Samouel, P 2003, *Essentials of Business Research Methods*, John Wiley & Sons, New York.
Hair, JFJ, Black, WC, Babin, BJ & Anderson, RE 2006, *Multivariate Data Analysis*, 6th edn, Upper Saddle, New Jersey.
Hair, JFJ, Black, WC, Babin, BJ & Anderson, RE 2010, *Multivariate Data Analysis*, 7th edn, Prentice Hall, New Jersey.
Hall, DB & Wang, L 2005, 'Two-Component Mixtures of Generalized Linear Mixed Effects Models for Cluster Correlated Data', *Satatistical Modelling*, vol. 5, no. 1, pp. 21-37.
Hamel, G & Breen, B 2007, *The Future of Management*, Harvard Business School Publishing, Massachusetts, USA.
Han, H, Hsu, L-T & Sheu, C 2010, 'Application of the Theory of Planned Behavior to Green Hotel Choice: Testing the Effect of Environmental Friendly Activities', *Tourism Management*, vol. 31, no. 3, pp. 325-34.
Handfield, RB & Bechtel, C 2002, 'The Role of Trust and Relationship Structure in Improving Supply Chain Responsiveness', *Industrial Marketing Management*, vol. 31, no. 4, pp. 367-82.
Handfield, RB & Nichols, EL 1999, *Introduction to Supply Chain Management*, Prentice Hall, New Jersey.
Harrison, A & Van Hoek, R 2008, *Logistics Management and Strategy: Competing through the Supply Chain* 3edn, Prentice Hall Financial Times, United Kingdom.

Harrison, JS, Hitt, MA, Hoskisson, RE & Ireland, RD 2001, 'Resource Complementarity in Business Combinations: Extending the Logic to Organizational Alliances', *Journal of Management*, vol. 27, no. 6, pp. 679-90.

Hartline, MD & Ferrell, OC 1996, 'The Management of Customer-Contact Service Employees: An Empirical Investigation.', *Journal of Marketing*, October 1.

Hashim, M & Ahmad, S 2008, 'Internationalization of Malaysian Sme's Influencing Factors, Sources of Information and Options', paper presented to 2008 International Council for Business World Conference (ICSB) World Conference, Nova Scotia, Canada.

Hayes, RB & Jaikumar, R 1988, 'New Technologies, Obsolete Organizations', *Harvard Bus. Rev.*, vol. 66, no. 5, pp. 77-85.

Hayes, RH 1985, 'Strategic Planning - Forward in Reverse', *Harvard Business Review*, vol. 63, no. 6, pp. 111 - 9.

Hayes, RH & Pisano, GP 1994, 'Beyong World-Class: The New Manufacturing Strategy', *Harvard Business Review*, no. January - February, pp. 77 - 86.

Hayes, RH & Pisano, GP 1996, 'Manufacturing Strategy: At the Intersection of Two Paradigm Shifts', *Production and Operations Management*, vol. 5, no. 1, pp. 25-41.

Hayes, RH & Wheelwright, SC 1984., *Restoring Our Competitive Edge : Competing through Manufacturing*, Wiley, New York.

Hayes, RH, Wheelwright, SC & Clark, KB 1988, *Dynamic Manufacturing : Creating the Learning Organization*, Free Press New York

He, N 2012, 'How to Maintain Sustainable Competitive Advantages-Case Study on the Evolution of Organizational Strategic Management', *International Journal of Business Administration*, vol. 3, no. 5, pp. 45 - 51.

Healy, M & Perry, C 2000, 'Comprehensive Criteria to Judge Validity and Reliability of Qualitative Research within the Realism Paradigm', *Qualitative Market Research: An International Journal*, vol. 3, no. 3, pp. 118-26.

Heide, JB & John, G 1992, 'Do Norms Matter in Marketing Relationships?', *Journal of Marketing*, vol. 56, no. 2, pp. 32-44.

Heidt, TVD 2008, *Developing and Testing Model of Cooperative Interorganizational Relationships (Iors) in Product Innovation in an Australian Manufacturing Context: A Multi-Stakeholder Perspective*, Sourthern Cross University, Lismore.

Heikkilä, J 2002, 'From Supply to Demand Chain Management: Efficiency and Customer Satisfaction', *Journal of Operations Management*, vol. 20, no. 6, pp. 747-67.

Heiman, B & Nickerson, JA 2002, 'Towards Reconciling Transaction Cost Economics and the Knowledge-Based View of the Firm: The Context of Interfirm Collaborations', *International Journal of the Economics of Business*, vol. 9, no. 1, pp. 97-116.

Helfat, CE & Peteraf, MA 2003, 'The Dynamic Resource-Based View: Capability Lifecycle', *Strategic Management Journal*, vol. 27, no. 10, pp. 997 - 1010.

Hervani, AA, Helms, MM & Sarkis, J 2005, 'Performance Measurement for Green Supply Chain Management', *Benchmarking: An International Journal*, vol. 12, no. 4, pp. 330 - 53.

Hess, AM & Rothaermel, FT 2011, 'When Are Assets Complementary? Star Scientists, Strategic Alliances, and Innovation in the Pharmaceutical Industry', *Strategic Management Journal*, vol. 32, no. 8, pp. 895-909.

Hillman, AJ, Keim, GD & Luce, RA 2001, 'Board Composition and Stakeholder Performance: Do Stakeholder Directors Make a Difference?', *Business & Society*, vol. 40, no. 3, pp. 295-314.

Hines, P 1996, 'Network Sourcing : A Discussion of Causality within the Buyer-Supplier Relationship', *European Journal of Purchasing & Supply Management*, vol. 2, no. 1, pp. 7-20.

Hitt, MA, Dacin, MT, Levitas, E, Arregle, J-L & Borza, A 2000, 'Partner Selection in Emerging and Developed Market Contexts: Resource-Based and Organizational Learning Perspectives', *The Academy of Management Journal*, vol. 43, no. 3, pp. 449-67.

Hitt, MA, Freeman, RE & Harrison, JS 2008, *The Blackwell Handbook of Strategic Management*, Blackwell Publishing Ltd.

Hitt, MA, Ireland, RD & Lee, H-u 2000, 'Technological Learning, Knowledge Management, Firm Growth and Performance: An Introductory Essay', *Journal of Engineering and Technology Management*, vol. 17, no. 3-4, pp. 231-46.

Ho, R 2006, *Handbook of Univariate and Multivariate Data Analysis and Interpretation with Spss*, Chapman & Hall/CRC, Broken Sound Parkway, NW.

Hoang, H & Rothaermel, FT 2005, 'The Effect of General and Partner-Specific Alliance Experience on Joint R&D Project Performance', *The Academy of Management Journal*, vol. 48, no. 2, pp. 332-45.

Hoe, SL 2008, 'Issues and Procedure in Adopting Structural Equation Modeling Techique', *Journal of Applied Quantitative Methods*, vol. 3, no. 1, pp. 76-83.

Holcomb, TR & Hitt, MA 2007, 'Toward a Model of Strategic Outsourcing', *Journal of Operations Management*, vol. 25, pp. 464-81.

Holmberg, S 2000, 'A Systems Perspective on Supply Chain Measurements', *International Journal of Physical Distribution & Logistics Management*, vol. 30, no. 10, pp. 847 - 68.

Holmes-Smith, P 2000, *Introduction to Structural Equation Modelling Using Amos 4.0 and Lisrel 8.30*, School Research, Evaluation and Meaurement Services, Canberra.

Holmes-Smith, P, Coote, L & Cunningham, E 2004, 'Structural Equation Modeling: From the Fundamentals to Advanced Topics.', *SREAMS Melbourne*.

Holmes-Smith, P, Coote, L & Cunningham, E 2006, 'Structural Equation Modeling: From the Fundamentals to Advanced Topics.', *School Research,Evaluation and Measurement Services, Melbourne (VIC)*.

Holmes-Smith, P & Rowe, KJ 1994, 'The Development and Use of Congeneric Measurement Models in School Effectiveness Research: Improving the Reliability and Validity of Composite and Latent Variables for Fitting Multilevel and Structural Equation Models', paper presented to International Congress for School Effectiveness, Melbourne, 3-6 January.

Hong, P & Kim, SC 2012, 'Business Network Excellence for Competitive Advantage: Case of Korean Firms', *International Journal of Business Excellence*, vol. 5, no. 5, pp. 448-62.

Hooper, D, Coughlam, J & Mullen, MR 2008, 'Structural Equation Modeling: Guidelines for Determining Model Fit', *The Electronic Journal of Business Research Methods*, vol. 6, no. 1, pp. 53-60.

Hoskisson, RE & Busenitz, LW 2001, 'Market Uncertainty and Learning Distance in Corporate Entrepreneurship Entry Mode Choice.', in MA Hitt, RD Ireland, SM Camp & DL Sexton (eds), *Strategic Entrepreneurship: Creating a New Integrated Mindset*, Blackwell Publishers, in press, Oxford, U.K.

Hoyt, J & Huq, F 2000, 'From Arms-Length to Collaboration Relationships in the Supply Chain:An Evolutionary Process', *International Journal of Physical Distribution & Logistics Management*, vol. 30.

Hsieh, Y-C & Hiang, S-T 2004, *Total Quality Management & Business Excellence*, vol. 15, no. 1, pp. 43-58.

Hu, L-T & Bentler, PM 1995, 'Evaluating Model Fit', in R.H.Hoyle (ed.), *Structural Equation Modeling: Concepts, Issues, and Applications*, Sage Publications, Thousand Oaks, CA, US, pp. 76-99.

Huang, CC, Liang, WY & Lin, SH 2009, 'An Agile Approach for Supply Chain Modeling', *Transportation Research Part E: Logistics and Transportation Review*, vol. 45, no. 3, pp. 380-97.

Huang, SH, Uppal, M & Shi, F 2002, 'A Product Driven Approach to Manufacturing Supply Chain Selection', *International Journal of Supply Chain Management*, vol. 7, no. 4, pp. 189-99.

Hugos, M 2006, *Essentials of Supply Chain Management*, 2nd edn, JohnWiley & Sons, New Jersey.

Hulland, J, Chow, YH & Lam, S 1996, 'Use of Causal Models in Marketing Research: A Review', *International Journal of Research in Marketing*, vol. 13, no. 2, pp. 181-97.

Hult, GTM, Hurley, RF & Knight, GA 2004, 'Innovativeness: Its Antecedents and Impact on Business Performance', *Industrial Marketing Management*, vol. 33, no. 5, pp. 429-38.

Humphreys, PK, Li, WL & Chan, LY 2004, 'The Impact of Supplier Development on Buyer–Supplier Performance', *Omega*, vol. 32, no. 2, pp. 131-43.

Ibeh, K, Brock, JK-U & Zhou, YJ 2004, 'The Drop and Collect Survey among Industrial Populations: Theory and Empirical Evidence', *Industrial Marketing Management*, vol. 33, no. 2, pp. 155-65.

Inman, RA, Sale, RS, Green Jr, KW & Whitten, D 2011, 'Agile Manufacturing: Relation to Jit, Operational Performance and Firm Performance', *Journal of Operations Management*, vol. 29, no. 4, pp. 343-55.

Ireland, RD, Hitt, MA & Vaidyanath, D 2002, 'Alliance Management as a Source of Competitive Advantage', *Journal of Management*, vol. 28, no. 3, pp. 413-46.

Jaccard, J & Wan, CK 1996, *Lisrel Analyses of Interaction Effects in Multiple Regression*, Sage, Newbury Park.

Jap, SD 2001, 'Perspectives on Joint Competitive Advantages in Buyer-Supplier Relationships', *International Journal of Research in Marketing*, vol. 18, no. 1-2, pp. 19-35.

Jarvis, Cheryl B, MacKenzie, Scott B & Podsakoff, Philip M 2003, 'A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research', *Journal of Consumer Research*, vol. 30, no. 2, pp. 199-218.

Jiang, X, Li, Y & Gao, S 2008, 'The Stability of Strategic Alliances: Characteristics, Factors and Stages', *Journal of International Management*, vol. 14, no. 2, pp. 173-89.

Johnston, DA, McCutcheon, DM, Stuart, FI & Kerwood, H 2004, 'Effects of Supplier Trust on Performance of Cooperative Supplier Relationships', *Journal of Operations Management*, vol. 22, no. 1, pp. 23-38.

Kaefer, F & Bendoly, E 2004, 'Measuring the Impact of Organizational Constraints on the Success of Business-to-Business E-Commerce Efforts: A Transactional Focus', *Information & Management*, vol. 41, no. 5, pp. 529-41.

Kale, P, Dyer, JH & Singh, H 2002, 'Alliance Capability, Stock Market Response, and Long-Term Alliance Success: The Role of the Alliance Function', *Strategic Management Journal*, vol. 23, no. 8, pp. 747-67.

Kale, P, Singh, H & Perlmutter, H 2000, 'Learning and Protection of Proprietary Assets in Strategic Alliances: Building Relational Capital', *Strategic Management Journal*, vol. 21, no. 3, pp. 217 - 37.

Kanter, RM 1994, 'Collaborative Advantage: The Art of Alliances', *Harvard Business Review*, vol. 72, no. 4, p. 96.

Kanter, RM 1994, 'Collaborative Advantage: The Art of Alliances.', *Harvard Business Review*, vol. 72, no. 4, pp. 96 - 108.

Kaplan, RS & Norton, DP 1992, 'The Balanced Scoreboard-Measures That Drives Performance', *Harvard Business Review*, vol. January - February, pp. 71 - 9.

Kashyap, V & Sivadas, E 2012, 'An Exploratory Examination of Shared Values in Channel Relationships', *Journal of Business Research*, vol. 65, no. 5, pp. 586-93.

Kelly, MJ, Schaan, JL & Joncas, H 2002, 'Managing Alliance Relationships: Key Challenges in the Early Stages of Collaboration', *R&D Management*, vol. 32, no. 1, pp. 11-22.

Kenny, DA & McCoach, DB 2003, 'Effect of the Number of Variables on Measures of Fit in Structural Equation Modeling', *Structural Equation Modeling: A Multidisciplinary Journal*, vol. 10, no. 3, pp. 333-51.

Ketokivi, M & Schroeder, R 2004, 'Manufacturing Practices, Strategic Fit and Performance: A Routine-Based View', *International Journal of Operations & Production Management*, vol. 24, no. 2, pp. 171 - 91.

Khalid, S & Larimo, J 2012, 'Affects of Alliance Entrepreneurship on Common Vision, Alliance Capability and Alliance Performance', *International Business Review*, vol. 21, no. 5, pp. 891-905.

Kickul, JR, Griffiths, MD, Jayaram, J & Wagner, SM 2011, 'Operations Management, Entrepreneurship, and Value Creation: Emerging Opportunities in a Cross-Disciplinary Context', *Journal of Operations Management*, vol. 29, no. 1–2, pp. 78-85.

Kim, SW 2006, 'Effects of Supply Chain Management Practices, Integration and Competition Capability on Performance', *International Journal of Supply Chain Management*, vol. 11, no. 3, pp. 241-8.

Kim, SW 2009, 'An Investigation on the Direct and Indirect Effect of Supply Chain Integration on Firm Performance', *International Journal of Production Economics*, vol. 119, no. 2, pp. 328-46.

Kisperska-Moron, D & de Haan, J 2011, 'Improving Supply Chain Performance to Satisfy Final Customers: “Leagile” Experiences of a Polish Distributor', *International Journal of Production Economics*, vol. 133, no. 1, pp. 127-34.

Kline, RB 1998, *Principles and Practice of Structural Equation Modeling*, Guildwood, New York.

Kline, RB 2005, *Principles and Practice of Structural Equation Modeling*, The Guilford Press: New York.
Kogg, B & Mont, O 2012, 'Environmental and Social Responsibility in Supply Chains: The Practise of Choice and Inter-Organisational Management', *Ecological Economics*, vol. 83, no. 0, pp. 154-63.
Koh, SCL, Demirbag, M, Bayraktar, E, Tatoglu, E & Zaim, S 2007, 'The Impact of Supply Chain Management Practices on Performance of Smes', *Industrial Management & Data Systems*, vol. 107, no. 1, pp. 103 - 24.
Kozan, MK, Wasti, SN & Kuman, A 2006, 'Management of Buyer-Supplier Conflict: The Case of the Turkish Automotive Industry', *Journal of Business Research*, vol. 59, no. 6, pp. 662-70.
Kuei, C-h, Madu, CN & Lin, C 2010, 'Developing Global Supply Chain Quality Management Systems', *International Journal of Production Research*, vol. 49, no. 15, pp. 4457-81.
Kumar, G & Banerjee, RN 2012, 'An Implementation Strategy for Collaboration in Supply Chain: An Investigation and Suggestions', *International Journal of Services and Operations Management*, vol. 11, no. 4, pp. 407-27.
Kumar, N 1996, 'The Power of Trust in Manufacturer-Retailer Relationships', *Harvard Business Review*, vol. 74, no. November-December, pp. 92-106.
Kumar, R 2005, *Research Methodology: A Step-by-Step Guide for Beginners*, SAGE, London.
Kwon, I-WG & Suh, T 2005, 'Trust, Commitment and Relationships in Supply Chain Management: A Path Analysis', *Supply Chain Management*, vol. 10, no. 1, pp. 26 - 33.
Lambert, DM, Emmelhainz, MA & Gardner, JT 1999, 'Building Successful Logistics Partnerships', *Journal of Business Logistics*, vol. 20, no. 1, pp. 165-81.
Lambert, DM & Schwieterman, MA 2012, 'Supplier Relationship Management as a Macro Business Process', *Emerald*, vol. 17.
Lamming, R 1996, 'Squaring Lean Supply with Supply Chain Management', *International Journal of Operations & Production Management*, vol. 16, no. 2, pp. 183 - 96.
Lang, JC 2001, 'Managing in Knowledge-Based Competition', *Journal of Organizational Change Management*, vol. 14, no. 6, pp. 539 - 53.
Lavie, D 2006, 'The Competitive Advantage of Interconnected Firms: An Extension of the Resource-Based View ', *Academy of Management Review*, vol. 31, no. 3, pp. 638-58.
Lavie, D & Singh, H 2012, 'The Evolution of Alliance Portfolios: The Case of Unisys', *Industrial and Corporate Change*, vol. 21, no. 3, pp. 763-809.
Lee, HL 2002, 'Aligning Supply Chain Strategies with Product Uncertainties', *California Management Review Repint Series*, vol. 44, no. 3, pp. 105-19.
Lee, J-N 2001, 'The Impact of Knowledge Sharing, Organizational Capability and Partnership Quality on Is Outsourcing Success', *Information & Management*, vol. 38, no. 5, pp. 323-35.
Leenders, MR, Johnson, PF, Flynn, AE & Fearon, HE 2006, *Purchasing and Supply Management*, 13th Edition edn, McGraw-Hill, New York.
Lejeune, MA & Yakova, N 2005, 'On Characterizing the 4 C's in Supply Chain Management', *Journal of Operations Management*, vol. 23, no. 1, pp. 81-100.

Lewis, I & Talalayevsky, A 2000, 'Third-Party Logistics: Leveraging Information Technology', *Journal of Business Logistics*, vol. 21, no. 2, pp. 173-82.
Li, L, Qian, G & Qian, Z 2012, 'Do Partners in International Strategic Alliances Share Resources, Costs, and Risks?', *Journal of Business Research*, no. 0.
Li, S & Lin, B 2006, 'Accessing Information Sharing and Information Quality in Supply Chain Management', *Decision Support Systems*, vol. 42, no. 3, pp. 1641-56.
Li, S, Ragu-Nathan, B, Ragu-Nathan, TS & Subba Rao, S 2006, 'The Impact of Supply Chain Management Practices on Competitive Advantage and Organizational Performance', *Omega*, vol. 34, no. 2, pp. 107-24.
Li, X, Goldsby, TJ & Holsapple, CW 2009, 'Supply Chain Agility: Scale Development', *International Journal of Logistics Management*, vol. 20, no. 3, pp. 408 - 24.
Liao, Y, Hong, P & Rao, SS 2010, 'Supply Management, Supply Flexibility and Performance Outcomes: An Empirical Investigation of Manufacturing Firms', *Journal of Supply Chain Management*, vol. 46, no. 3, pp. 6-22.
Lin, H 2012, 'Cross-Sector Alliances for Corporate Social Responsibility Partner Heterogeneity Moderates Environmental Strategy Outcomes', *Journal of Business Ethics*, vol. 110, no. 2, pp. 219-29.
Lin, H & Darnall, N 2010, 'Strategic Alliances for Environmental Protection', in J Sarkis, JJ Cordeiro & D Vazquez Brust (eds), *Facilitating Sustainable Innovation through Collaboration*, Springer Netherlands, pp. 233-46.
Lin, J-SC & Chang, Y-C 2012, 'Retailers' New Product Acceptance Decisions: Incorporating the Buyer-Supplier Relationship Perspective', *Emerald*, vol. 27.
Liou, JJH, Tzeng, G-H, Tsai, C-Y & Hsu, C-C 2011, 'A Hybrid Anp Model in Fuzzy Environments for Strategic Alliance Partner Selection in the Airline Industry', *Applied Soft Computing*, vol. 11, no. 4, pp. 3515-24.
Lloréns, FJ, Ruiz, A & Molina, LM 2003, 'An Analysis of the Relationship between Quality and Perceived Innovation: The Case of Financial Firms', *Industrial Management & Data Systems*, vol. 103, no. 8, pp. 579 - 90.
Lohr, SL 2009, *Sampling: Design and Analysis*, Cengage Learning, Boston, USA.
Lorange, P & Roos, J 1991, 'Why Some Strategic Alliance Succed and Others Fail', *Journal of Business Strategy*, no. January/February, pp. 25-30.
Love, JH & Roper, S 2009, 'Organizing Innovation: Complementarities between Cross-Functional Teams', *Technovation*, vol. 29, no. 3, pp. 192-203.
Luo, Y 1997, 'Partner Selection and Venturing Success: The Case of Joint Ventures with Firms in the People's Republic of China', *Organization Science*, vol. 8, no. 6, pp. 648-62.
Lynch, RP 1990, 'Building Alliances to Penetrate European Markets', *The Journal of Business Strategy*, no. March/April, pp. 4-8.
Maclennan, B, Langley, J & Kypri, K 2011, 'Distributing Surveys: Postal Versus Drop-and-Collect', *Epidemiology*, vol. 22, no. 3, pp. 443 - 4
Madhok, A 1995, 'Opportunism and Trust in Joint Venture Relationships: An Exploratory Study and a Model', *Scandinavian Journal of Management*, vol. 11, no. 1, pp. 57-74.
Mahapatra, SS 2011, 'Supplier Selection in Supply Chain Management: A Fuzzy Multi-Criteria Decision-Making Approach', *International Journal of Services and Operations Management*, vol. 8, no. 1, pp. 108-26.

Maidique, MA & Zirger, BJ 1984, 'A Study of Success and Failure in Product Innovation: The Case of the U.S. Electronics Industry', vol. EM-31, no. 4, pp. 192 - 203,

Malhotra, NK (ed.) 2004, *Marketing Research: An Applied Orientation*, 4th edn, Prentice Hall, Upper Saddle River, New Jersey.

Malim, T & Birch, A 1997, *Research Methods and Statistics.*, MacMillan, London.

Mapes, J, New, C & Szwejczewski, M 1997, 'Performance Trade-Offs in Manufacturing Plants', *International Journal of Operations & Production Management*, vol. 17, no. 10, pp. 1020 - 33.

Marsh, HW & Balla, J 1994, 'Goodness of Fit in Confirmatory Factor Analysis: The Effects of Sample Size and Model Parsimony', *Quality & Quantity*, vol. 28, pp. 185-217.

Marsh, HW, Hau, K-T, Balla, JR & Grayson, D 1998, 'Is More Ever Too Much? The Number of Indicators Per Factor in Confirmatory Factor Analysis', *Multivariate Behavioral Research*, vol. 33, no. 2, pp. 181-220.

Maruyama, GM 1998, *Basics of Structural Equation Modeling*, Sage:Thousand Oaks, CA.

Maskell, BH 1991, *Performance Measurement for World Class Manufacturing* Productivity Press, Portland, OR.

Mathews, JA 2006, 'Resources and Activities Are Two Sides of the Same Coin: Duality of the Activities and Resource-Based Views of Strategic Management
', paper presented to Conference on Strategic Management, Copenhagen.

Matopoulus, A, Vlachopoulou, M & Manthou, V 2007, 'A Conceptual Framework for Supply Chain Collaboration: Empirical Evidence from the Agri-Food Industry', *International Journal of Supply Chain Management*, vol. 12, no. 3, pp. 177-86.

McDonald, RP & Ho, M-HR 2002, 'Principles and Practice in Reporting Structural Equation Analyses', *Psychological Methods*, vol. 7, no. 1, pp. 64 - 82.

McKeown, M 2008, *The Truth About Innovation*, Prentice Hall, London, United Kingdom.

McQuitty, S 2004, 'Statistical Power and Structural Equation Models in Business Research', *Journal of Business Research*, vol. 57, no. 2, pp. 175-83.

McWilliams, A & Siegel, D 2000, 'Corporate Social Responsibility and Financial Performance: Correlation or Misspecification?', *Strategic Management Journal*, vol. 21, no. 5, pp. 603-9.

Medori, D & Steeple, D 2000, 'A Framework for Auditing and Enhancing Performance Measurement Systems', *International Journal of Operations & Production Management*, vol. 20, no. 5, pp. 520 - 33.

Meier, M 2011, 'Knowledge Management in Strategic Alliances: A Review of Empirical Evidence', *International Journal of Management Reviews*, vol. 13, no. 1, pp. 1-23.

Mentzer, JT, DeWitt, W, Keebler, JS & Min, S 2001, 'Defining Supply Chain Management', *Journal of Business Logistics*, vol. 22, no. 2, pp. 1-26.

Merchant, H 2005, 'The Structure–Performance Relationship in International Joint Ventures: A Comparative Analysis', *Journal of World Business*, vol. 40, no. 1, pp. 41-56.

MIDA 2009, *Malaysia-Investment Performance 2008*, Malaysian Investment Development Authority, Kuala Lumpur.

MIDA 2012, *Malaysia Investment Performance 2011*, Malaysian Investment Development Authority, Kuala Lumpur.

Miller, R & Acton, C 2009, *Spss for Social Scientists*, Palgrave Macmillan.

Min, S, Roath, AS, Daugherty, PJ, Genchev, SE, Chen, H, Arndt, AD & Richey, RG 2005, 'Supply Chain Collaboration: What's Happening?', *The International Journal of Logistics Management*, vol. 16, no. 2, pp. 237 - 56.

MITI 2006, *Industrial Master Plan (Imp3) 2006 - 2020: Malaysia Towards Global Competitiveness*, Ministry of International Trade and Industry.

MITI 2006, *The Third Industrial Master Plan (Imp3)*.

MITI 2009, *Malaysia International Trade and Industry Report 2008*, Ministry of International Trade and Industry Malaysia, Kuala Lumpur.

Moberg, CR, Cutler, BD, Gross, A & Speh, TW 2002, 'Identifying Antecedents of Information Exchange within Supply Chains', *International Journal of Physical Distribution & Logistics Management*, vol. 32, no. 9, pp. 755 - 70.

Mohr, J & Spekman, R 1994, 'Characteristics of Partnership Success: Partnership Attributes, Communication Berhavior, and Conflict Resolution Techniques', *Strategic Management Journal*, vol. 15, no. 2, pp. 135-52.

Monczka, RM, Petersen, KJ, Handfield, RB & Ragatz, GL 1998, 'Success Factors in Strategic Supplier Alliances: The Buying Company Perspective*', *Decision Sciences*, vol. 29, no. 3, pp. 553-77.

Monczka, RM, Trent, RJ & Callahan, TJ 1994, 'Supply Base Strategies to Maximize Supplier Performance.', *International Journal of Physical Distribution and Logistics*, vol. 23, no. 4, pp. 42-54.

Morgan, RM & Hunt, SD 1994, 'The Commitment-Trust Theory of Relationship Marketing', *Journal of Marketing*, vol. 58, pp. 20-38.

Mulaik, SA, James, LR, Van Alstine, J, Bennett, N, Lind, S & Stilwell, CD 1989, 'Evaluation of Goodness-of-Fit Indices for Structural Equation Models', *Psychological Bulletin*, vol. 105, no. 3, pp. 430 - 45.

Myhr, N & Spekman, RE 2005, 'Collaborative Supply-Chain Partnerships Built Upon Trust and Electronically Mediated Exchange', *Journal of Business & Industrial Marketing*, vol. 20, no. 4/5, pp. 179 - 86.

Myhr, N & Spekman, RE 2005, 'Collaborative Supply Chain Partnerships Built Upon Trust and Electronically Mediated Exchange', *Journal of Business & Industrial Marketing*, vol. 20, no. 4/5, pp. 179 - 86.

Nah, FF-H, Lau, JL-S & Kuang, J 2001, 'Critical Factors for Successful Implementation of Enterprise Systems', *Business Process Management Journal,*, vol. 7, no. 3, pp. 285 - 96.

Narasimhan, R & Das, A 1999, 'Manufacturing Agility and Supply Chain Management Practices', *PRODUCTION AND INVENTORY MANAGEMENT JOURNAL*, vol. 40, no. 1.

Narasimhan, R, Nair, A, Griffith, DA, Arlbjørn, JS & Bendoly, E 2009, 'Lock-in Situations in Supply Chains: A Social Exchange Theoretic Study of Sourcing Arrangements in Buyer-Supplier Relationships', *Journal of Operations Management*, vol. 27, no. 5, pp. 374-89.

Narasimhan, R, Swink, M & Kim, SW 2006, 'Disentangling Leanness and Agility: An Empirical Investigation', *Journal of Operations Management*, vol. 24, pp. 440-57.

Narasimhan, R & Talluri, S 2009, 'Perspectives on Risk Management in Supply Chains', *Journal of Operations Management*, vol. 27, no. 2, pp. 114-8.
Narayanan, VK 2000, *Managing Technology and Innovation for Competitive Advantage*, {Prentice Hall}.
Narus, JA & Anderson, JC 1996, 'Rethinking Distribution: Adaptive Channels', *Harvard Business Review*, vol. 74, no. 4, pp. 112-20.
Nasiriyar, M & Jolly, DR 2006, 'Value Creation through Strategic Alliances: The Importance of the Characteristics of the Partners and the Resources Brought by Them', paper presented to PICMET, Istanbul, Turkey, 9-13 July.
Nath, P, Nachiappan, S & Ramanathan, R 2010, 'The Impact of Marketing Capability, Operations Capability and Diversification Strategy on Performance: A Resource-Based View', *Industrial Marketing Management*, vol. 39, no. 2, pp. 317-29.
Naylor, JB, Naim, MM & Berry, D 1999, 'Leagility: Integrating the Lean and Agile Manufacturing Paradigms in the Total Supply Chain', *International Journal of Production Economics*, vol. 62, pp. 107-18.
NDSC 2008, *Sme Annual Report 2007*, National SME Development Council, Kuala Lumpur.
Ndubisi, NO 2008, 'Malaysia', in *Small and Medium Enterprises in the Pacific Rim*, Arah Pendidikan Sdn Bhd, Shah Alam.
Netemeyer, RG, Bearden, WO & Sharma., S 2003, *Scaling Procedures : Issues and Applications* Thousand Oaks, Sage Publications, CA.
Neuman, WL 2011, *Social Research Methods: Qualitative and Quantitative Approaches*, 7 edn, Allyn & Bacon, Boston.
Nicolaou, AI, Sedatole, KL & Lankton, NK 2011, 'Integrated Information Systems and Alliance Partner Trust*', *Contemporary Accounting Research*, vol. 28, no. 3, pp. 1018-45.
Nielsen, BB & Gudergan, S 2012, 'Exploration and Exploitation Fit and Performance in International Strategic Alliances', *International Business Review*, vol. 21, no. 4, pp. 558-74.
Nooteboom, B, Berger, H & Noorderhaven, NG 1997, 'Effects of Trust and Governance on Relational Risk', *The Academy of Management Journal*, vol. 40, no. 2, pp. 308-38.
NSDC 2010, *Sme Annual Report 2009/10: Transformation to the New Economic Model*, National SME Development Council, Kuala Lumpur.
NSDC 2011, *Sme Annual Report 2010/11: Leveraging Opportunities, Realising Growth*, SME Corp Malaysia, Kuala Lumpur.
Nunnaly, JC 1978, *Psychometric Theory*, 2 edn, Mc Graw Hill, New York.
Nunnaly, JC & Bernstein, I 1994, *Psychometric Theory*, New York: McGraw Hill.
Nurmilaakso, J-M 2008, 'Adoption of E-Business Functions and Migration from Edi-Based to Xml-Based E-Business Frameworks in Supply Chain Integration', *International Journal of Production Economics*, vol. 113, no. 2, pp. 721-33.
Nyaga, GN, Whipple, JM & Lynch, DF 2010, 'Examining Supply Chain Relationships: Do Buyer and Supplier Perspectives on Collaborative Relationships Differ?', *Journal of Operations Management*, vol. In Press, Corrected Proof.
Ogawa, S & Piller, FT 2006, 'Reducing the Risks of New Product Development', *MIT Sloan Management Review*.
Pallant, J (ed.) 2011, *Spss Survival Manual*, 4th edn, Allen & Unwin.

Palmatier, RW, Dant, RP & Grewal, D 2007, 'A Comparative Longitudinal Analysis of Theoretical Perspectives of Interorganizational Relationship Performance', *Journal of Marketing*, vol. 71, no. 4, pp. 172-94.

Palmatier, RW, Miao, CF & Fang, E 2007, 'Sales Channel Integration after Mergers and Acquisitions: A Methodological Approach for Avoiding Common Pitfalls', *Industrial Marketing Management*, vol. 36, no. 5, pp. 589-603.

Pansiri, J 2005, 'The Influence of Managers' Characteristics and Perceptions in Strategic Alliance Practice', *Management Decision*, vol. 43, no. 9, pp. 1097-113.

Pansiri, J 2008, 'The Effects of Characteristics of Partners on Strategic Alliance Performance in the Sme Dominated Travel Sector', *Tourism Management*, vol. 29, pp. 101-15.

Parise, S & Casher, A 2003, 'Alliance Portfolios: Designing and Managing Your Network of Business-Partner Relationships', *The Academy of Management Executive (1993-2005)*, vol. 17, no. 4, pp. 25-39.

Parsons, AL 2002, 'What Determines Buyer-Seller Relationship Quality? An Investigation from the Buyer's Perspective', *Journal of Supply Chain Management*, pp. 4-12.

Paulraj, A & Chen, IJ 2007, 'Strategic Buyer–Supplier Relationships, Information Technology and External Logistics Integration', *Journal of Supply Chain Management*, vol. 43, no. 2, pp. 2-14.

Paulraj, A, Lado, AA & Chen, IJ 2008, 'Inter-Organizational Communication as a Relational Competency: Antecedents and Performance Outcomes in Collaborative Buyer-Supplier Relationships', *Journal of Operations Management*, vol. 26, no. 1, pp. 45-64.

Payne, T & Peters, MJ 2004, 'What Is the Right Supply Chain for Your Products?', *The International Journal of Logistics Management*, vol. 15, no. 2, pp. 77-92.

PEMANDU 2012, *Economic Transformation Plan: A Roadmap for Malaysia*, Performance Management and Delivery Unit, Prime's Minister Department, Putrajaya, Malaysia.

Penrose, E 1959, *The Theory and Growth of a Firm*, 3 edn, Oxford University Press, New York.

Ping Jr., RA 2004, 'On Assuring Valid Measures for Theoretical Models Using Survey Data', *Journal of Business Research*, vol. 57, no. 2, pp. 125-41.

Podsakoff, PM, MacKenzie, SB, Lee, J-Y & Podsakoff, NP 2003, 'Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies', *Journal of Applied Psychology*, vol. 88, no. 5, pp. 879-903.

Podsakoff, PM & Organ, DW 1986, 'Self-Reports in Organizational Research: Problems and Prospects', *Journal of Management*, vol. 12, no. 4, pp. 531-44.

Ponis, ST 2012, 'Supply Chain Resilience: Definition of Concept and Its Formative Elements', *The Journal of Applied Business Research*, vol. 28, no. 5, pp. 921 - 30.

Powell, TC 1995, 'Total Quality Management as Competitive Advantage: A Review and Empirical Study', *Strategic Management Journal*, vol. 16, no. 1, pp. 15-37.

Power, DJ, Sohal, AS & Rahman, S-U 2001, 'Critical Success Factors in Agile Supply Chain Management - an Empirical Study', *International Journal of Physical Distribution & Logistics Management*, vol. 31, no. 4, pp. 247 - 65.

Prahalad, CK & Hamel, G 1990, 'The Core Competence of the Corporation', *Harvard Business Review*, no. May-June, pp. 79 - 91.
Prajogo, D & Olhager, J 2012, 'Supply Chain Integration and Performance: The Effects of Long-Term Relationships, Information Technology and Sharing, and Logistics Integration', *International Journal of Production Economics*, vol. 135, no. 1, pp. 514-22.
Prasad, S & Tata, J 2000, 'Information Investment in Supply Chain Management', *Logistics Information Management*, vol. 13, no. 1, pp. 33 - 8.
Pun, KF & White, AS 2005, 'A Performance Measurement Paradigm for Integrating Strategy Formulation: A Review of Systems and Frameworks', *International Journal of Management Reviews*, vol. 7, no. 1, pp. 49-71.
Punch, KF 2003, *Survey Research: The Basics*, 1st edn, SAGE Publications Ltd, London.
Qureshi, I & Compeau, D 2009, 'Assessing between-Group Differences in Information Systems Research: A Comparison of Covariance-and Component-Based Sem', *MIS Q.*, vol. 33, no. 1, pp. 197-214.
Ragatz, GL, Handfield, RB & Petersen, KJ 2002, 'Benefits Associated with Supplier Integration into New Product Development under Conditions of Technology Uncertainty', *Journal of Business Research*, vol. 55, no. 5, pp. 389-400.
Ramasamy, B, Chakrabarty, A & Cheah, M 2004, 'Malaysia's Leap into the Future: An Evaluation of the Multimedia Super Corridor', *Technovation*, vol. 24, no. 11, pp. 871-83.
Reinhold, O & Alt, R 2012, 'Social Customer Relationship Management: State of the Art and Learnings from Current Projects', paper presented to 25th Bled eConference eDependability: Reliable and Trustworthy eStructures, eProcesses, eOperations and eServices for the Future
June 17, 2012 – June 20, 2012; , Bled, Slovenia.
Reis, HT & Judd, CM (eds) 2000, *Handbook of Reseach Methods in Social and Personality Psychology*, Cambridge University Press, New York.
Reve, T & Stern, LW 1979, 'Interorganizational Relations in Marketing Channels', *Academy of Management Review*, vol. 4, no. 3, pp. 405-16.
Robertson, PW 2006, 'The Impact of Supply Chain Process Integration on Business Performance', PhD thesis, University of Wollongong.
Robinson, CJ & Malhotra, MK 2005, 'Defining the Concept of Supply Chain Quality Management and Its Relevance to Academic and Industrial Practice', *International Journal of Production Economics*, vol. 96, no. 3, pp. 315-37.
Rose, C & Thomsen, S 2004, 'The Impact of Corporate Reputation on Performance:: Some Danish Evidence', *European Management Journal*, vol. 22, no. 2, pp. 201-10.
Rumelt, RP 1997, 'Towards a Strategic Theory of the Firm', in NJ Foss (ed.), *Resources, Firms, and Strategies: A Reader in the Resource-Based Perspective*, Oxford University Press, New York, USA.
Rushton, A & Oxley, J 1991, *Handbook of Logistics and Distribution Management*, Kogan Page, London.
Russ, M & Camp, SM 1997, 'Strategic Alliances and Technology Transfer: An Extended Paradigm', *International Journal of Technology Management*, vol. 14, no. 5, pp. 513-27.

Saad, M, Jones, M & James, P 2002, 'A Review of the Progress Towards the Adoption of Supply Chain Management (Scm) Relationships in Construction', *European Journal of Purchasing & Supply Management*, vol. 8, no. 3, pp. 173-83.

Saaty, TL 1990, 'Physics as a Decision Theory', *European Journal of Operational Research*, vol. 48, pp. 98-104.

Saaty, TL 1994, 'How to Make a Decision: The Analytic Hierarchy Process', *The Institute of Management Sciences*, vol. 24, no. 6, pp. 19-43.

Saeed, KA, Malhotra, MK & Grover, V 2005, 'Examining the Impact of Interorganizational Systems on Process Efficiency and Sourcing Leverage in Buyer-Supplier Dyads', *Decision Sciences*, vol. 36, no. 3, pp. 365-96.

Sahakijpicharn, K 2007, 'Guanxi Network and Business Performance of Sino-Thai Smes', PhD thesis, University of Wollongong.

Sahay, BS 2003, 'Understanding Trust in Supply Chain Relationships', *Industrial Management & Data Systems*, vol. 103, no. 8, pp. 553-63.

Sambasivan, M, Siew-Phaik, L, Abidin Mohamed, Z & Choy Leong, Y 2013, 'Factors Influencing Strategic Alliance Outcomes in a Manufacturing Supply Chain: Role of Alliance Motives, Interdependence, Asset Specificity and Relational Capital', *International Journal of Production Economics*, vol. 141, no. 1, pp. 339-51.

Sanders, NR & Premus, R 2002, 'It Application in Supply Chain Organizations: A Link between Competitive Priorities and Organizational Benefits', *Journal of Business Logistics*, vol. 23, no. 1, pp. 65-83.

Sarkar, M, Echambadi, R, Cavusgil, ST & Aulakh, PS 2001, 'The Influence of Complementarity, Compatibility, and Relationship Capital on Alliance Performance', *Journal of the Academy of Marketing Science*, vol. 29, no. 4, pp. 358-73.

Sarkis, J & Talluri, S 2001, 'Agile Supply Chain Management', in *Agile Manufacturing: The 21st Century Competitive Strategy*, Elsevier Science Ltd, Oxford, pp. 359-76.

Schiele, H, Veldman, J & Huttenger, L 2011, 'Supplier Innovativeness and Supplier Pricing:The Role of Preferred Customer Status', *International Journal of Innovation Management*, vol. 15, no. 01, pp. 1-27.

Schilling, MA & Hill, CWL 1998, 'Managing the New Product Development Process: Strategic Imperatives', *The Academy of Management Executive (1993-2005)*, vol. 12, no. 3, pp. 67-81.

Schmidt, J & Keil, T 2012, 'What Makes a Resource Valuable? Identifying the Drivers of Firm-Idiosyncratic Resource Value', *Academy of Management Review*.

Schnietz, KE & Epstein, MJ 2005, 'Exploring the Financial Value of a Reputation for Corporate Social Responsibility During a Crisis', *Corporate Reputation Review*, vol. 7, pp. 327 - 45.

Schreiber, JB, Stage, FK, King, J, Nora, A & Barlow, EA 2006, 'Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review', *The Journal of Educational Research*, vol. 99 (6), no. July/August.

Schroeder, RG, Bates, KA & Junttila, MA 2002, 'A Resource-Based View of Manufacturing Strategy and the Relationship to Manufacturing Performance', *Strategic Management Journal*, vol. 23, no. 2, pp. 105-17.

Schumacker, RE & Lomax, RG 2004, *A Beginner's Guide to Structural Equation Modeling*, Lawrence Erlbaum Associates, Mahwah, New Jersey.

Schumacker, RE & Lomax, RG 2008, *A Beginner's Guide to Structural Equation Modeling*, 2nd edn, Lawrence Erlbaum Associates, Mahwah, New Jersey.

Sekaran, U & Bougie, R 2010, *Research Methods for Business: A Skill Building Approach*, Wiley, London.

Selldin, E & Olhager, F 2007, 'Linking Products with Supply Chains:Testing Fisher's Model', *International Journal of Supply Chain Management*, vol. 12, no. 1, pp. 42-51.

Shah, R & Goldstein, SM 2006, 'Use of Structural Equation Modeling in Operations Management Research: Looking Back and Forward', *Journal of Operations Management*, vol. 24, no. 2, pp. 148-69.

Shamdasani, PN & Sheth, JN 1995, 'An Experimental Approach to Investigating Satisfaction and Continuity in Marketing Alliances', *European Journal of Marketing*, vol. 29, no. 4, p. 6.

Sharifi, H & Zhang, Z 1999, 'A Methodology for Achieving Agility in Manufacturing Organisations: An Introduction', *International Journal of Production Economics*, vol. 62, no. 1-2, pp. 7-22.

Shaughnessy, JJ & Zechmeister, EB 1997, *Research Methods in Psychology*, McGraw-Hill, USA.

Sher, PJ & Yang, PY 2005, 'The Effects of Innovative Capabilities and R&D Clustering on Firm Performance: The Evidence of Taiwan's Semiconductor Industry', *Technovation*, vol. 25, no. 1, pp. 33-43.

Sheridan, JH 1998, 'The Supply-Chain Paradox', *Industry Week*, vol. 247, no. 3, p. 20.

Sheu, C, Yen, HR & Chae, B 2006, 'Determinants of Supplier-Retailer Collaboration: Evidence from an International Study', *International Journal of Operations & Production Management*, vol. 26, no. 1, pp. 24-49.

Shi, X & Liao, Z 2012, 'The Mediating Effects of Interfirm Business Process Integration and Joint Teamwork on Firm Performance in Supply Chains', *Asia Pacific Journal of Management*, pp. 1-22.

Shin, H, Collier, DA & Wilson, DD 2000, 'Supply Management Orientation and Supplier/Buyer Performance', *Journal of Operations Management*, vol. 18, no. 3, pp. 317-33.

Singh, RK, Kumar, R & Shankar, R 2012, 'Supply Chain Management in Smes: A Case Study', *International Journal of Manufacturing Research*, vol. 7, no. 2, pp. 165-80.

Sinkovics, RR & Roath, AS 2004, 'Strategic Orientation, Capabilities, and Performance in Manufacturer — 3pl Relationships', *Journal of Business Logistics*, vol. 25, no. 2, pp. 43-64.

Sivo, SA, Fan, XT, Witta, EL & Willse, JT 2006, 'The Search for 'Optimal' Cutoff Properties: Fit Index Criteria in Strural Equation Modeling', *The Journal of Experimental Education*, vol. 74, no. 3, pp. 267-89.

Skinner, W 1969, 'Manufacturing - Missing Link in Corporate Strategy', *Harvard Business Review*, no. May-June, pp. 136 - 45.

Smals, RGM & Smits, AAJ 2012, 'Value for Value—the Dynamics of Supplier Value in Collaborative New Product Development', *Industrial Marketing Management*, vol. 41, no. 1, pp. 156-65.

Sobh, R & Perry, C 2006, 'Research Design and Data Analysis in Realism Research', *European Journal of Marketing*, vol. 40, no. 11/12, pp. 1194-209.

Sobhi, NA 2012, 'Comprehending Organizations Cultural Compatibility as a Success Factor in Alliance Formation: Five Case Studies on Cultural Compatibility', Jönköping University, .

Song, M & Di Benedetto, CA 2008, 'Supplier's Involvement and Success of Radical New Product Development in New Ventures', *Journal of Operations Management*, vol. 26, no. 1, pp. 1-22.

Spekman, RE, Jr, JWK & Myhr, N 1998, 'An Empirical Investigation into Supply Chain Management: A Perspective on Partnerships', *Supply Chain Management: An International Journal*, vol. 3, no. 2, pp. 53 - 67.

Spekman, RE, Kamauff, J & Spear, J 1999, 'Towards More Effective Sourcing and Supplier Management', *European Journal of Purchasing & Supply Management*, vol. 5, no. 2, pp. 103-16.

Spekman, RE, Spear, J & Kamauff, J 2002, 'Supply Chain Competency: Learning as a Key Component', *Supply Chain Management: An International Journal*, vol. 7, no. 1, pp. 41 - 55.

Stanley, LL & Wisner, JD 2001, 'Service Quality Along the Supply Chain: Implications for Purchasing', *Journal of Operations Management*, vol. 19, no. 3, pp. 287-306.

Steenkamp, JE, Batra, R & Alden, DL 2003, 'How Perceived Brand Globalness Creates Brand Value', *Journal of International Business Studies*, vol. 34, no. 1, pp. 53 - 65.

Stewart, G 1995, 'Supply Chain Performance Benchmarking Study Reveals Keys to Supply Chain Excellence', *Logistics Information Management*, vol. 8, no. 2, pp. 38 - 44.

Stock, JR & Boyer, SL 2009, 'Developing a Concensus Definition of Supply Chain Management: A Qualitative Study', *International Journal of Physical Distribution & Logistics Management*, vol. 39, no. 8, pp. 690-711.

Stuart, FI 1993, 'Supplier Partnerships: Influencing Factors and Strategic Benefits', *Journal of Supply Chain Management*, vol. 29, no. 4, pp. 21-9.

Stuart, FI 1997, 'Supply-Chain Strategy: Organizational Influence through Supplier Alliances', *British Journal of Management*, vol. 8, no. 3, pp. 223-36.

Stuart, TE 2000, 'Interorganizational Alliances and the Performance of Firms: A Study of Growth and Innovation Rates in a High-Technology Industry', *Strategic Management Journal*, vol. 21, pp. 791 - 811.

Suseno, Y & Ratten, V 2007, 'A Theoretical Framework of Alliance Performance: The Role of Trust, Social Capital and Knowledge Development', *Journal of Management & Organization*, vol. 13, no. 1, pp. 4-23.

Swafford, PM, Ghosh, S & Murthy, N 2006, 'The Antecedents of Supply Chain Agility of a Firm: Scale Development and Model Testing', *Journal of Operations Management*, vol. 24, no. 2, pp. 170-88.

Swafford, PM, Ghosh, S & Murthy, N 2008, 'Achieving Supply Chain Agility through It Integration and Flexibility', *International Journal of Production Economics*, vol. 116, no. 2, pp. 288-97.

Sweeney, JC & Webb, DA 2007, 'How Functional, Psychological, and Social Relationship Benefits Influence Individual and Firm Commitment to the Relationship', *Journal of Business & Industrial Marketing*, vol. 22, no. 7, pp. 474-88.

Swink, M, Narasimhan, R & Wang, C 2007, 'Managing Beyond the Factory Walls: Effects of Four Types of Strategic Integration on Manufacturing Plant Performance', *Journal of Operations Management*, vol. 25, no. 1, pp. 148-64.

Tabachnick, BG & Fidell, LS 2001, *Using Multivariate Statisticss*, Allyn and Bacon, Boston, MA.

Tabachnick, BG & Fidell, LS 2007, *Using Multivariate Statistics*, College Publishers:New York, New York.

Tabachnick, BG & Fidell, LS 2011, *Using Multivariate Statistics*, Pearson/Allyn & Bacon.

Tallon, PP & Pinsonneault, A 2011, 'Competing Perspectives on the Link between Strategic Information Technology Alignment and Organizational Agility: Insights from a Mediation Model', *MIS Q.*, vol. 35, no. 2, pp. 463-84.

Tan, CSL 2007, 'Sources of Competitive Advantage for Emerging Fast Growth Small-to-Medium Enterprises: The Role of Business Orientation, Marketing Capabilities, Customer Value, and Firm Performance', RMIT University. Management.

Tan, K-C & Cross, J 2012, 'Influence of Resource-Based Capability and Inter-Organizational Coordination on Scm', *Industrial Management & Data Systems*, vol. 112, no. 6, pp. 929 - 45.

Tan, K-C, Kannan, VR, Handfield, RB & Ghosh, S 1999, 'Supply Chain Management: An Empirical Study of Its Impact on Performance', *International Journal of Operations & Production Management*, vol. 19, no. 10, pp. 1034 - 52.

Tan, KC 2001, 'A Framework of Supply Chain Management Literature.', *European Journal of Purchasing and Supply Management*, vol. 17, no. 1, pp. 209-44.

Tan, KC 2002, 'Supply Chain Management: Practices, Concerns, and Performance Issues', *Journal of Supply Chain Management*, vol. 38, no. 1, pp. 42-53.

Tan, KC, Kannan, VR & Narasimhan, R 2007, 'The Impact of Operations Capability on Firm Performance', *International Journal of Production Research*, vol. 45, no. 21, pp. 5135-56.

Tan, KC, Lyman, SB & Wisner, JD 2002, 'Supply Chain Management: A Strategic Perspective', *International Journal of Operations & Production Management*, vol. 22, no. 6, pp. 614 - 31.

Tang, X & Rai, A 2012, 'The Moderating Effects of Supplier Portfolio Characteristics on the Competitive Performance Impacts of Supplier-Facing Process Capabilities', *Journal of Operations Management*, vol. 30, no. 1–2, pp. 85-98.

Tate, K 1996, 'The Elements of a Successful Logistics Partnership', *International Journal of Physical Distribution & Logistics*, vol. 26, no. 3, pp. 7-13.

Taylor, DA 2004, *Supply Chains: A Manager's Guide*, Addison-Wesley.

Teece, DJ 1986, 'Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy', *Research Policy*, vol. 15, no. 6, pp. 285-305.

Teece, DJ, Pisano, G & Shuen, A 1997, 'Dynamic Capabilities and Strategic Management', *Strategic Management Journal*, vol. 18, no. 7, pp. 509-33.

Thomas, AS, Litschert, RJ & Ramaswamy, K 1991, 'The Performance Impact of Strategy - Manager Coalignment: An Empirical Examination', *Strategic Management Journal*, vol. 12, no. 7, pp. 509-22.

Thorelli, HB 1986, 'Networks: Between Markets and Hierarchies', *Strategic Management Journal*, vol. 7, no. 1, pp. 37-51.

Thorgren, S, Wincent, J & Örtqvist, D 2010, 'Unleashing Synergies in Strategic Networks of Smes: The Influence of Partner Fit on Corporate Entrepreneurship', *International Small Business Journal*, vol. 30, no. 5, pp. 453–71.

Tran, Y, Hsuan, J & Mahnke, V 2011, 'How Do Innovation Intermediaries Add Value? Insight from New Product Development in Fashion Markets', *R&D Management*, vol. 41, no. 1, pp. 80-91.

Turner, L & Reisinger, Y 1999, 'Importance and Expectations of Destination Attributes for Japanese Tourists to Hawaii and the Gold Coast Compared', *Asia Pacific Journal of Tourism Research*, vol. 4, no. 2, pp. 1 - 18.

Upton, DM 1995, 'Flexibility as Process Mobility: The Management of Plant Capabilities for Quick Response Manufacturing', *Journal of Operations Management*, vol. 12, no. 3-4, pp. 205-24.

Vaaland, TI & Owusu, RA 2012, 'What Is a Responsible Supply Chain?', *International Journal of Business and Management*, vol. 7, no. 4, pp. 154 - 71.

Vachon, S & Klassen, RD 2006, 'Green Project Partnership in the Supply Chain: The Case of the Package Printing Industry', *Journal of Cleaner Production*, vol. 14, no. 6–7, pp. 661-71.

Van der Vaart, T & Van Donk, DP 2008, 'A Critical Review of Survey-Based Research in Supplychainintegration', *International Journal of Production Economics*, vol. 111, no. 31, pp. 42 - 55.

Van Gils, A & Zwart, PS 2009, 'Alliance Formation Motives in Smes: An Explorative Conjoint Analysis Study', *International Small Business Journal*, vol. 27, no. 1.

van Hoek, RI, Harrison, A & Christopher, M 2001, 'Measuring Agile Capabilities in the Supply Chain', *International Journal of Operations & Production Management*, vol. 21, no. 1, pp. 126-48.

Varadarajan, PR & Cunningham, MH 1995, 'Strategic Alliances: A Synthesis of Conceptual Foundations', *Journal of the Academy of Marketing Science*, vol. 23, no. 4, pp. 282-96.

Vázquez-Carrasco, R & Foxall, GR 2006, 'Influence of Personality Traits on Satisfaction, Perception of Relational Benefits, and Loyalty in a Personal Service Context', *Journal of Retailing and Consumer Services*, vol. 13, no. 3, pp. 205-19.

Veal, AJ 2005, *Business Research Methods: A Managerial Approach*, Pearson, Australia.

Venkatraman, N & Ramanujam, V 1986, 'Measurement of Business Performance in Strategy Research: A Comparison of Approaches', *The Academy of Management Review*, vol. 11, no. 4, pp. 801-14.

Vickery, SK, Jayaram, J, Droge, C & Calantone, R 2003, 'The Effects of an Integrative Supply Chain Strategy on Customer Service and Financial Performance: An Analysis of Direct Versus Indirect Relationships', *Journal of Operations Management*, vol. 21, no. 5, pp. 523-39.

Vickery, Sn, Calantone, R & Dröge, C 1999, 'Supply Chain Flexibility: An Empirical Study', *Journal of Supply Chain Management*, vol. 35, no. 3, pp. 16-24.

Vinodh, S, Kumar, VU & Girubha, RJ 2012, 'Thirty-Criteria-Based Agility Assessment: A Case Study in an Indian Pump Manufacturing Organisation', *The International Journal of Advanced Manufacturing Technology*, vol. 63, no. 9-12, pp. 915-29.

Vonderembse, MA, Uppal, M, Huang, SH & Dismukes, JP 2006, 'Designing Supply Chains: Towards Theory Development', *International Journal of Production Economics*, vol. 100, no. 2, pp. 223-38.

Wagner, SM & Bode, C 2008, 'An Empirical Examination of Supply Chain Performance Along Several Dimensions of Risks', *Journal of Business Logistics*, vol. 29, no. 1, pp. 114-8.

Walter, A & Ritter, T 2003, 'The Influence of Adaptations, Trust, and Commitment on Value-Creating Functions of Customer Relationships', *Journal of Business & Industrial Marketing*, vol. 18, no. 4/5, pp. 353 - 65.

Wassmer, U 2010, 'Alliance Portfolios: A Review and Research Agenda', *Journal of Management*, vol. 36, no. 1, pp. 141-71.

Weigelt, C & Sarkar, MB 2012, 'Performance Implications of Outsourcing for Technological Innovations: Managing the Efficiency and Adaptability Trade-Off', *Strategic Management Journal*, vol. 33, no. 2, pp. 189-216.

Wernerfelt, B 1984, 'A Resource-Based View of the Firm', *Strategic Management Journal*, vol. 5, no. 2, pp. 171-80.

Whipple, JM & Frankel, R 2000, 'Strategic Alliance Success Factors', *Journal of Supply Chain Management*, vol. 36, no. 3, pp. 21-8.

Wilson, D 1995, 'An Integrated Model of Buyer-Seller Relationships', *Journal of the Academy of Marketing Science*, vol. 23, no. 4, pp. 335-45.

Wilson, DT, Soni, PK & O'Keeffe, M 1995, *Modeling Customer Retention as a Relationship Problem*, Institute for the Study of Business Markets, The Pennsylvania State University.

Wind, J & Mahajan, V 1997, 'Editorial: Issues and Opportunities in New Product Development: An Introduction to the Special Issue', *Journal of Marketing Research*, vol. 34, no. 1, pp. 1-12.

Wisner, JD 2003, 'A Structural Equation Model of Supply Chain Management Strategies and Firm Performance', *Journal of Business Logistics*, vol. 24, no. 1, pp. 1-26.

Wisner, JD, Tan, K-C & Leong, GK 2009, *Principles of Supply Chain Management: A Balanced Approach*, 3rd edn, Cengage Learning, South Western, USA.

Wong, A, Tjosvold, D & Zhang, P 2005, 'Developing Relationships in Strategic Alliances: Commitment to Quality and Cooperative Interdependence', *Industrial Marketing Management*, vol. 34, no. 7, pp. 722-31.

Wong, CY, Boon-itt, S & Wong, CWY 2011, 'The Contingency Effects of Environmental Uncertainty on the Relationship between Supply Chain Integration and Operational Performance', *Journal of Operations Management*, vol. 29, no. 6, pp. 604-15.

Wouters, M, Anderson, JC, Narus, JA & Wynstra, F 2009, 'Improving Sourcing Decisions in Npd Projects: Monetary Qualification of Point of Difference', *Journal of Operations Management*, vol. 27, pp. 64 - 77.

Wu, WY, Shih, H-A & Chan, H-C 2009, 'The Analytic Network Process for Partner Selection Criteria in Strategic Alliances', *Expert Systems with Applications*, vol. 36, no. 3, Part 1, pp. 4646-53.

Wuyts, S & Geyskens, I 2005, 'The Formation of Buyer-Supplier Relationships: Detailed Contract Drafting and Close Partner Selection', *Journal of Marketing*, vol. 69, no. 4, pp. 103-17.

Yadama, GN & Pandey, S 1995, 'Effect of Sample Size on Goodness-Fit of-Fit Indices in Structural Equation Models', *Journal of Social Service Research*, vol. 20, no. 3-4, pp. 49-70.

Yamin, S, Gunasekaran, A & Mavondo, FT 1999, 'Relationship between Generic Strategies, Competitive Advantage and Organizational Performance: An Empirical Analysis', *Technovation*, vol. 19, pp. 507 - 18.

Yan, M & Yang, T 2012, 'Dynamic Gaming and Risk-Incorporated Bargaining Decision Support Model for Strategic Alliance Projects', *Applied Mathematics & Information Sciences: An International Journal*, vol. 6, no. 2, pp. 677 - 84.

Yang, K-S & Lin, C-Y 2012, 'Network Dynamics and Innovative Performance: The Moderating Effects of Network Resources', *African Journal of Business Management*, vol. 6, no. 4, pp. 1545 - 52.

Yang, Q & Crowther, D 2012, 'The Relationship between Csr, Profitability and Sustainability in China', in G Aras & D Crowther (eds), *Business Strategy and Sustainability (Developments in Corporate Governance and Responsibility)*, Emerald Group Publishing Limited, vol. 3, pp. 155 - 75.

Yazici, HJ 2012, 'Buyer Perceptions on the Buyer–Supplier Collaborative Relationship and Performance: A Service Example', *International Journal of Services and Operations Management*, vol. 12, no. 2, pp. 165-87.

Yin, RK 2009, *Case Study Research : Design and Methods*, 4 edn, Sage Publications Los Angeles, California.

Yu, W & Ramanathan, R 2012, 'Managing Strategic Business Relationships in Retail Operations: Evidence from China', *Asia Pacific Journal of Marketing and Logistics*, vol. 24, no. 3, pp. 372 - 93.

Yuksel, A, Yuksel, F & Bilim, Y 2010, 'Destination Attachment: Effects on Customer Satisfaction and Cognitive, Affective and Conative Loyalty', *Tourism Management*, vol. 31, no. 2, pp. 274-84.

Yusuf, YY, Gunasekaran, A, Adeleye, EO & Sivayoganathan, K 2004, 'Agile Supply Chain Capabilities: Determinants of Competitive Objectives', *European Journal of Operational Research*, vol. 159, no. 2, pp. 379-92.

Yusuf, YY, Sarhadi, M & Gunasekaran, A 1999, 'Agile Manufacturing:: The Drivers, Concepts and Attributes', *International Journal of Production Economics*, vol. 62, no. 1–2, pp. 33-43.

Zacharia, ZG, Nix, NW & Lusch, RF 2011, 'Capabilities That Enhance Outcomes of an Episodic Supply Chain Collaboration', *Journal of Operations Management*, vol. 29, no. 6, pp. 591-603.

Zajac, EJ, D'Aunno, TA & Burns, LR 2011, 'Managing Strategic Alliance', in *Shortell and Kaluzny's Health Care Management: Organization, Design, and Behaviour*, Cengage Learning, Clifton Park, NY.

Zhang, H, Shu, C, Jiang, X & Malter, AJ 2010, 'Managing Knowledge for Innovation: The Role of Cooperation, Competition, and Alliance Nationality', *Journal of International Marketing*, vol. 18, no. 4, pp. 74-94.

Zhang, Q, Vonderembse, MA & Lim, J-S 2003, 'Manufacturing Flexibility: Defining and Analyzing Relationships among Competence, Capability, and Customer Satisfaction', *Journal of Operations Management*, vol. 21, no. 2, pp. 173-91.

Zheng, Y, Liu, J & George, G 2009, 'The Dynamic Impact of Innovative Capability and Inter-Firm Network on Firm Valuation: A Longitudinal Study of Biotechnology Start-Ups', *Journal of Business Venturing*, vol. In Press, Corrected Proof.

Zhu, Q, Sarkis, J & Lai, K-h 2011, 'An Institutional Theoretic Investigation on the Links between Internationalization of Chinese Manufacturers and Their Environmental Supply Chain Management', *Resources, Conservation and Recycling*, vol. 55, no. 6, pp. 623-30.

Zikmund, WG 2003, *Business Research Methods*, 7th edn, Thomson/South-Western, Cincinnati, OH.

Zikmund, WG 2003, *Essentials of Marketing Research*, 2nd edn, Thomson, London.

Zimmerman, D 1989, 'Computationally Efficient Restricted Maximum Likelihood Estimation of Generalized Covariance Functions', *Mathematical Geology*, vol. 21, no. 7, pp. 655-72.

Appendix

Appendix 1

ANALYTIC HIERARCHY PROCESS SURVEY

Project Title:
Critical Determinants of Agile Supply Chain in the Relationships between Multinational Companies and Small and Medium Enterprises in Malaysian Electrical and Electronics Industry

Investigator:
Nazura Mohamed Sayuti (PhD candidate)
E78716@ems.rmit.edu.au / nazurasayuti@gmail.com
Tel: +6017-3009756

Senior Supervisor:
Prof Shams Rahman (Senior Supervisor)
School of Business IT and Logistics
RMIT University
Email: shams.rahman@rmit.edu.au
Tel: +613-9925 5530

Critical Determinants of Agile Supply Chain in the Relationships between Multinational Companies and Small and Medium Enterprises in Malaysian Electrical and Electronics Industry

This Analytic Hierarchy Process (AHP) survey is a key part of a study on critical determinants of agile supply chain in the relationships between multinational companies and small and medium enterprises in Malaysian electrical and electronics industry. Critical determinants of agile supply chain are integral part of the buyer and supplier relationships, which affect the supply chain agility and impact on organization performance. The objectives of this study are;

i. To explore the supply chains between multinational companies (MNCs) and small and medium enterprises (SMEs) in electrical and electronics industry in Malaysia.

ii. To identify and categorize the determinants of agile supply chain in the relationships between MNCs and SMEs in Malaysian electrical and electronics industry.

By using AHP, the critical determinants will be arranged in a hierarchic structure descending from an overall goal to criteria, sub-criteria and alternatives in successive level. The findings provide overall view of the complex relationships inherent in the relationships between MNCs and SMEs in the context of agile supply chain, and help decision makers to assess the issues in each level and compare the elements accurately.

ALL INFORMATION WILL REMAIN STRICTLY CONFIDENTIAL

The instructions below will assist you in completing the questionnaire:

- Referring to table 1 for the scale, below is an example how to complete the questionnaire

Q-1	To what extend does partner characteristics capability important over two other determinants to achieve supply chain agility?	1	2	3	4	5	6	7	8	9

By circling 5, your response is partner characteristics capability is strongly importance determinant of agile supply chain as compared to the other two determinants of agile supply chain.

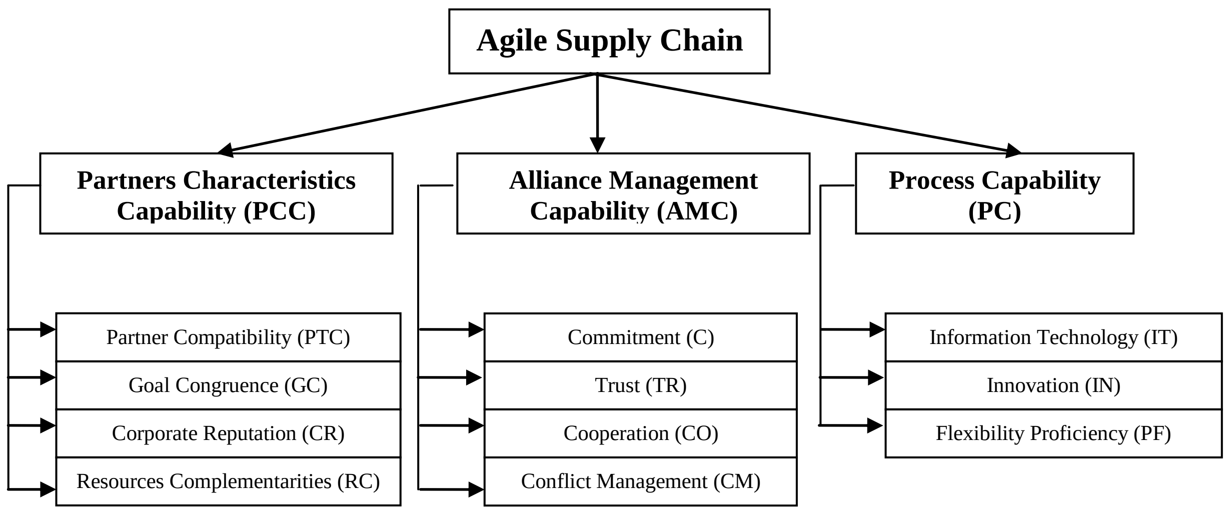
Table 1: The fundamental scale

Intensity of importance on an absolute scale	Definition	Explanation
1	Equal importance	Two activities/factors contribute equally to the objective
3	Moderate importance of one over another	Experience and judgment moderately favor one activity/factor over another
5	Essential or strong importance	Experience and judgment strongly favor one activity/factor over another
7	Very strong importance	An activity/factor is strongly favored and its dominance demonstrated in practice
9	Extreme importance	The evidence favoring one activity/ factor over another is of the highest possible order of affirmation
2,4,6,8	Intermediate values between the two adjacent judgments	When compromise is needed

- It is important that you **PLEASE ANSWER ALL QUESTIONS** to the best of your knowledge, even if some may appear to be similar. Your answers to all sections of this questionnaire are vital to the success of this study. Unfortunately partly answered surveys are not useable. Therefore, please do not leave questions unanswered.
- There is no right or wrong answers.
- If you wish to comment on any of the questions, please use the space provided at the end of the questionnaire.
- The findings of this study will be reported in aggregated form, so no organization, department or individual respondent can be identified.
- If you have any queries or comments about the questionnaire, please do not hesitate to contact **Nazura Sayuti at +6017-3009756**, or via email: E78716@ems.rmit.edu.au **/nazurasayuti@gmail.com**

We appreciate highly your time and effort to participate in this research project. If you would like a copy of the findings sent to you, please fax, phone or send your business card separately to the questionnaire. The answers to the survey will be kept in strict confidence. The names of participating ministries, departments and statutory bodies, government-owned companies and individuals will not be released.

THE PROPOSED FRAMEWORK OF AGILE SUPPLY CHAIN IN THE RELATIONSHIP BETWEEN MULTINATIONAL COMPANIES (MNCs) AND SMALL AND MEDIUM ENTERPRISES (SMEs) IN MALAYSIAN ELECTRICAL AND ELECTRONICS INDUSTRY



Hierarchy Level 1: Determinants of Agile Supply Chain

Agile Supply Chain: Agile supply chain is a new strategic concept intended to improve the competitiveness of firms producing innovative products.

Partner's Characteristics Capability (PCC):
Partners' characteristics may help in the formation of good relationship capital or the behavioral aspects of a relationship. Partnering firms need to have different resource and capability profiles yet similarities in their social institutions (Sarkar et al.2001). Partner compatibility in terms of their, goals similarity between partners, corporate reputation of the partner and resources complementarities are determinants of partners characteristics capability which need to be evaluated.

Alliance Management Capability (AMC): Supply chain is the network of operating processes while network is viewed as a system of business processes. Process efficiency and successful workable relationship are likely the objectives in buyer and supplier relationship that requires close coordination between buyers and suppliers (Saeed et al. 2005). For a relationship to be workable it requires commitment, trust and cooperation from the partners and the ability to manage any conflict which may arise between them.

Process Capability (PC): Processes are characterized by buyer and supplier integrated process for product design, manufacturing, delivery and support system. There is a need for adaptation and synchronization of process in the buyer and supplier relationship. Information technology, innovation and flexibility proficiency of partners are seen to be vital in process capability.

Comparison Matrix-L1

	Partner's Characteristics Capability (PCC)	**Alliance Management Capability (AMC)**	**Process Capability (PC)**
Partner's Characteristics Capability	**1**		
Alliance Management Capability		**1**	
Process Capability			**1**

Q1: **To what extend 'partner's characteristics capability' is important as compared to 'alliance management' in achieving supply chain agility?**

Q2: **To what extend 'partner characteristics capability' is important as compared to 'process capability' in achieving supply chain agility?**

Q3: **To what extend 'alliance management capability' is important as compared to 'process capability' in achieving supply chain agility?**

Hierarchy Level 2a: Measurement of Partner's Characteristics Capability

Partner compatibility (PTC): Compatibility requires each partner in the partnership to clearly understand its partner's business needs from the outset and spell out ground rules, procedures and specific role of each partner (Tate 1996; Pansiri 2008). Compatibility covers the array of issues including broad historical, philosophical, strategic grounds, values and principles and hope for the future (Kanter 1995; Shamdasani & Sheth 1995).

Goal Congruence (GC): A successful alliance must be based on compatible goals. The ideal is when strategic goals converge, while competitive goals diverge (Lorange & Roos 1991). According to Lynch (1990), clarity of focus is vital, ambiguous goals, fuzzy directions, and uncoordinated activities are the primary causes of failure of cooperative venture.

Corporate Reputation (CR): Al-Khalifa and Peterson (1999) have identified critical and important factors in international joint venture partner selection criteria are related to reputation of the alliance partners. Reputation may derive from the unique internal features of the company which describe the history of the company's interactions with its constituents.

Resources Complementarities (RC): Resources complementarities determine the organization's mix of unique and valuable resources available to achieve strategic objectives, thus enhancing competitive viability of the alliance (Love and Roper 2009). Sarkar (2001) suggests that performance is likely to be enhanced when firms are able to manage the paradox involved in choosing a firm that is different, yet similar.

	Partner Compatibility (PTC)	**Goal Congruence (GC)**	**Corporate Reputation (CR)**	**Resources Complementarities (RC)**
Partner Compatibility	**1**			
Goal Congruence		**1**		
Corporate Reputation			**1**	
Resources Complementarities				**1**

Q1: **To what extend 'partner compatibility' is appropriate as compared to 'goal congruence' in describing partners' characteristics capability?**

Q2: **To what extend 'partner compatibility' is appropriate as compared to 'corporate reputation' in describing partner's characteristics capability?**

Q3: **To what extend 'partner compatibility' is appropriate as compared to 'resources complementarities' in describing partner's characteristics capability?**

Q4: **To what extend 'goal congruence' is appropriate as compared to 'corporate reputation' in describing partner's characteristics capability?**

Q5: **To what extend 'goal congruence' is appropriate as compared to resources complementarities in describing partners' characteristics capability?**

Q6: **To what extend 'corporate reputation' is appropriate as compared to 'resources complementarities' in describing partner's characteristics capability?**

Hierarchy Level 2b: Measurement of Alliance Management Capability

Commitment (C): It refers to the willingness of partners to make an effort on behalf of the relationship and the belief of the committed party that the relationship is worth to ensure that it lasts indefinitely (Morgan & Hunt 1994). It refers to the willingness of partners to apply effort on behalf of the relationship that can be sustained in the face of unanticipated problems (Morgan & Hunt 1994; Dwyer et. at 1987; Walter & Ritter 2003).

Trust (TR): The expectation that the relationship partner is willing and able to act in the best interest of the relationship or the belief in the partner's honesty, goodwill, and competence (Heikkila 2002; Handfield & Bechtel 2002, Kwon & Suh 2005; Sahay 2003).

Cooperation (CO): The willingness to undertake complimentary actions to achieve mutual goals (Brouthers et.al 1995; Palmatier et.al 2007).

Conflict Management (CM): It refers to managing the conflicts which begin when one party perceives that the other has frustrated, or is about to frustrate, some concern of his (Kozan et.al 2006).

	Commitment (C)	Trust (TR)	Cooperation (CO)	Conflict Management (CM)
Commitment	**1**			
Trust		**1**		
Cooperation			**1**	
Conflict Management				**1**

Q1: **To what extend 'commitment' is critical as compared to 'trust' in describing alliance management capability?**

Q2: **To what extend 'commitment' is critical as compared to 'cooperation' in describing alliance management capability?**

Q3: **To what extend 'commitment' is critical as compared to 'conflict management' in describing alliance management capability?**

Q4: **To what extend 'trust' is critical as compared to 'cooperation' in describing alliance management capability?**

Q5: **To what extend 'trust' is critical as compared to 'conflict management' in describing alliance management capability?**

Q6: **To what extend 'cooperation' is critical as compared to 'conflict management' in describing alliance management capability?**

Hierarchy Level 2c: Measurement of Process Capability

Information technology (IT): Central to alliance is the exchange of large amounts of information along the supply chain, including planning and operational data, real time information, and communication. The backbone of the supply chain business is IT which is used to acquire, process, and share information among supply chain partners for effective decision making (Sanders & Premus 2002)

Innovation (IN): Innovation is a new way of doing something or "new stuff is made useful" (McKeown 2008). It may refer to incremental and growing revolutionary changes in thinking, products, process, or organization.

Flexibility proficiency (FP): Flexibility is defined as increasing the range of products available, improving the firm's ability to respond quickly, and achieving good performance over a wide range of products (Upton 1995; De Toni & Tonchia 2005). Firms are required to increase its adaptation capability to respond to demand changes for value creation through business relationship.

	Information Technology (IT)	**Innovation (IN)**	**Flexibility Proficiency (FP)**
Information Technology	**1**		
Innovation		**1**	
Flexibility Proficiency			**1**

Q1: **To what extend 'information technology' is critical as compared to 'innovation' in developing process capability?**

Q2: **To what extend 'information technology' is critical as compared to 'flexibility proficiency' in developing process capability?**

Q3: **To what extend 'innovation' is critical as compared to 'flexibility proficiency' in developing process capability?**

Appendix 2

Portfolio Business
School of Business IT and Logistics

INVITATION TO PARTICIPATE IN A RESEARCH PROJECT
PROJECT INFORMATION STATEMENT

Project Title:
Antecedents of Supply Chain Relationships in Agile Environment: An Empirical Study of Malaysian Electrical And Electronics Industry

Investigator:

PhD Student
Nazura Mohamed Sayuti, RMIT University,
E78716@ems.rmit.edu.au/nazurasayuti@gmail.com,
(+6017) 3009756

Senior Supervisor
Prof Shams Rahman, RMIT University,
shams.rahman@rmit.edu.au,
(+613) 9925 5530

Dear Participant,

You are invited to participate in a PhD research project being conducted by RMIT University. These two pages are to provide you with an overview of the proposed research. Please read these pages carefully and be confident that you understand its contents before deciding whether to participate. The return of this questionnaire will imply your consent to participate in this survey. If you have any questions about the project, please ask one of the investigators identified above.

I am currently a research student in the School of Business IT and Logistics at RMIT University, Melbourne, Australia. This project is being conducted as a part of my PhD study. My supervisor for this project is Professor Shams Rahman. The project has been approved by the RMIT Business Human Resource Research Ethics Sub Committee.

The project seeks to explore the supply chains between MNCs and SMEs in electrical and electronics industry in Malaysia and the impact of supply chain agility on organization performance. Your participation is important for us to identify and categorize the critical determinants of agile supply chain in the relationships between buyers and suppliers in Malaysian electrical and electronics industry. By answering the questionnaire, you will provide us with an invaluable insight on critical determinants of agile supply chain in the relationships between multinational companies and small and medium enterprises in Malaysian electrical and

electronics industry. Your responses will contribute to understanding the interplay of a number of determinants of agile supply chain that impact on organizational performances. The finding of this study will be disseminated in conferences and published in journals.
If you are unduly concerned about your responses to any of questions or if you find participation in the project distressing, you should contact my supervisor as soon as convenient. My supervisor will discuss your concerns with your confidentially and suggest appropriate follow-up, if necessary.

Your privacy and **confidentiality will be strictly maintained** in such a manner that you will not be identified in the thesis report or any related publication. Any information that you provide can be disclosed only if (1) it is protect you or others from harm, (2) a court order is produced, or (3) you provide the researchers with written permission. Data will be only seen by my supervisor and examiners who will also protect you from any risk.

The questionnaire should not take more than 30 minutes to complete. Once you have completed the questionnaire, please return it to me in the enclosed postage-paid envelope. As you are not being identified in any way, your views will remain anonymous. The data will only be seen by the investigator and project supervisor.

The result of this study will be disseminated in the PhD thesis, paper for publication or presentation for conferences. The research data collected will be securely kept at RMIT University for a period of five (5) years before being destroyed.

To ensure that data collected is protected, the data will be retained upon completion of the project after which time paper records will be shredded and placed in a security recycle bin and electronic data will be deleted/destroyed in a secure manner. All hard data will be kept in a locked filing cabinet and soft data in a password protected computer in the office of the investigator in the School of Business IT and Logistics RMIT University. Data will be saved on the University Network System where practicable (as the system provides a high level of manageable security and data integrity, can provide secure remote access, and is backed up on a regular basis). Only the researcher/s will have access to the data.

I am assuring you that responses will remain confidential and anonymous.

If you have any queries regarding this project please contact me at or email me at e78716@ems.rmit.edu.au / or Prof Shams Rahman (+613)9925 5530 or email him at shams.rahman@rmit.edu.au

Thank you very much for your contribution to this research.

Yours Sincerely,

____

Nazura Mohamed Sayuti
PhD Student
School of Business IT and Logistics
RMIT University
Level 13, 239 Bourke Street
Melbourne, VIC 3000

ANTECEDENTS OF SUPPLY CHAIN RELATIONSHIPS IN AGILE ENVIRONMENT: AN EMPIRICAL STUDY OF MALAYSIAN ELECTRICAL AND ELECTRONICS INDUSTRY

This questionnaire is a key part of a study on critical antecedents of supply chain relationships between multinational companies and small and medium enterprises in Malaysian electrical and electronics industry. Today's competitive environment requires businesses to increasingly reliant on relationships they have with suppliers and are demanding that they adhere to a high standard. Managing relationships between members of the supply chain in agile environment is expected to become more complex due to greater need for rapid integration among members of agile relationships. Critical antecedents of supply chain relationship are integral part of the buyer and supplier relationships which affect the supply chain agility practices and impact on organizational performances.

ALL INFORMATION WILL REMAIN STRICTLY CONFIDENTIAL

To maintain anonymity, please do not write your name on the questionnaire. However, if you would like a summary of results, please contact Nazura Mohamed Sayuti by phone, fax or email as per contact details on the front page of this document.

The instructions below will assist you in completing the questionnaire:

- Below is an example how to complete the questionnaire

		Strongly Disagree				**Strongly Agree**
A-1	Our organization's values and norms are similar to our partner	1	2	3	4	5

By circling 4, your response is more towards strongly agree that your organization's values and norms are similar to your partner.

- It is important that you **PLEASE ANSWER ALL QUESTIONS** to the best of your knowledge, even if some may appear to be similar. Your answers to all sections of this questionnaire are vital to the success of this study. Unfortunately partly answered surveys are not useable. Therefore, please do not leave questions unanswered.
- There is no right or wrong answers.
- If you wish to comment on any of the questions, please use the space provided at the end of the questionnaire.
- The findings of this study will be reported in aggregated form, so no organization, department or individual respondent can be identified.
- If you have any queries or comments about the questionnaire, please do not hesitate to contact **Nazura Sayuti at** or via email: e78716@ems.rmit.edu.au

We appreciate highly your time and effort to participate in this research project. If you would like a copy of the findings sent to you, please fax, phone or send your business card separately to the questionnaire. The answers to the survey will be kept in strict confidence. The names of participating ministries, departments and statutory bodies, government-owned companies and individuals will not be released.

PART 1: PARTNER'S CHARACTERISTICS CAPABILITY

The following questions refer to partners' characteristics capability that relates partner compatibility and resources complementarities. Please indicate your response by circling on the following statements.

PO Partner Compatibility

		Strongly Disagree				Strongly Agree
PO1	Our organization's values and norms are similar to our partner	1	2	3	4	5
PO2	Our organization's goals and objectives are compatible to our partner.	1	2	3	4	5
PO3	Our organization and our partner have common views on most business matters.	1	2	3	4	5
PO4	Our organization's systems and tools are compatible to our partner.	1	2	3	4	5
PO5	Our organization and our partner have compatible organizational cultures.	1	2	3	4	5

RC Resources Complementarities

		Strongly Disagree				Strongly Agree
RC1	Our partner's **knowledge of customers** complemented our organization's resources and capabilities	1	2	3	4	5
RC2	Our partner's **channels of distribution** compensated our organization's resources and capabilities.	1	2	3	4	5
RC3	Our partner's **links with major buyers** complemented to a significant extent our organization's resources and capabilities	1	2	3	4	5
RC4	Our partner's **knowledge of technology management** compensated our organization's resources and capabilities	1	2	3	4	5
RC5	Our partner's **industry knowledge** compensated our organization's resources and capabilities	1	2	3	4	5
RC6	Our partner's **experience in related technologies** compensated our organization's resources and capabilities	1	2	3	4	5
RC7	Our partner's **systems and tools availability** compensated our organization's resources and capabilities	1	2	3	4	5

PART 2: ALLIANCE MANAGEMENT CAPABILITY

The following questions refer to alliance management capability that relates cooperation and conflict management. Please indicate your response by circling on the following statements.

CO Cooperation

		Strongly Disagree				Strongly Agree
CO1	Our organization willingly provides accurate strategic information to our partner	1	2	3	4	5
CO2	Our organization provides technical information to our partner if needed	1	2	3	4	5
CO3	Our organization shares operational information with our partner	1	2	3	4	5
CO4	Our organization always look for new ways to do business with our partner	1	2	3	4	5
CO5	Our organization makes strategic decisions in consultation with our alliance partner	1	2	3	4	5

CM Conflict Management

		Strongly Disagree				Strongly Agree
CM1	Our organization and our partner have developed explicit mechanism to resolve conflict(s)	1	2	3	4	5
CM2	Our organization and our partner resolve conflict (s) through close interaction with each other	1	2	3	4	5
CM3	Our organization and our partner undertake joint problem solving to avoid conflict	1	2	3	4	5
CM4	Our organization encourages employees to be culturally sensitive while resolving conflicts	1	2	3	4	5
CM5	Our organization involves top management to resolve conflicts if needed	1	2	3	4	5

PART 3: PROCESS CAPABILITY

The following questions concern with information technology, innovation and flexibility proficiency. Please indicate by circling on the following statements.

IT Information Technology

		Strongly Disagree				**Strongly Agree**
IT1	Our organization uses information technology enabled transaction processing to coordinate supply chain activities	1	2	3	4	5
IT2	Our organization has capable employees to use information technology enabled transaction processing	1	2	3	4	5
IT3	Our organization shares sensitive information with our partner	1	2	3	4	5
IT4	Exchange of information between our organization and our partner takes place frequently, informally and/or in a timely manner	1	2	3	4	5
IT5	Our organization and our partner keep each other informed about changes that may affect us	1	2	3	4	5

IN Innovative Capability

		Strongly Disagree				**Strongly Agree**
IN1	Our organization involves our partner in the product design and development stage	1	2	3	4	5
IN2	Our partner has major influence on the design of new products	1	2	3	4	5
IN3	Our organization emphasizes on constant innovation as part of our corporate culture	1	2	3	4	5
IN4	Our organization has the capacity to jointly develop new product and processing technologies to satisfy future needs	1	2	3	4	5
IN5	It is our organization's policy to constantly develop innovative capability in order to compete in the global market.	1	2	3	4	5

FP Flexibility Proficiency

		Strongly Disagree				**Strongly Agree**
FP1	Our partner is capable of responding to our changing needs and requirement	1	2	3	4	5
FP2	Our organization is able to adjust production volume to meet unexpected demand	1	2	3	4	5
FP3	Our organization and partner are able to produce a range of products for different types of customers	1	2	3	4	5
FP4	Our organization and partner increase the number of new products introduced each year to cope with new market competition	1	2	3	4	5

PART 4: SUPPLY CHAIN AGILITY PRACTICES

The following statements refer to development cycle time, manufacturing cycle time and delivery capability of your organization. Please indicate by circling on the following statements.

SCAP	Agility Practices	Strongly Disagree				Strongly Agree
SCAP1	The partnership enables our organization's capacity to increase frequencies of new product introductions	1	2	3	4	5
SCAP2	The partnership enables our organization's ability to increase levels of product customization	1	2	3	4	5
SCAP3	The partnership enables our organization's manufacturing technologies to reduce manufacturing lead time	1	2	3	4	5
SCAP4	The partnership enables our organization to act promptly on changes in customer requirement	1	2	3	4	5

PART 5: SUPPLY CHAIN OPERATIONAL PERFORMANCE

The following statements refer to your organization's supply chain activities and business performance. Please indicate by circling on the following statements.

SCOP	Operational Performance	Strongly Disagree				Strongly Agree
SCOP1	This alliance has improved our organization delivery performance	1	2	3	4	5
SCOP2	This alliance has improved our order cycle times	1	2	3	4	5
SCOP3	This alliance has increased our forecast accuracy	1	2	3	4	5
SCOP4	This alliance has improved our order processing accuracy	1	2	3	4	5

PART 5: SUPPLY CHAIN FINANCIAL PERFORMANCE

SCFP	Financial Performance	Strongly Disagree				Strongly Agree
SCFP1	Our organization is satisfied with this alliance in terms of profitability	1	2	3	4	5
SCFP2	Our organization is satisfied with this alliance in terms of market share	1	2	3	4	5
SCFP3	Our organization is satisfied with this alliance in terms of sales growth	1	2	3	4	5

PART 6: RESPONDENT PROFILE

The following information requires details of the respondents. Please indicate your answer in the box provided.

1. i) Position in the organization:

Executive Officer □ Senior/Higher Executive Officer □
Assistant Manager □ Manager □
Senior Manager □ Head of Unit □
Head of Department □ Deputy Director □
Director □

ii) Which department are you attached to?

Production □ Supply Chain □ Operations □ Procurement □
Others □, please specify ________________________

2. Education:

Post-graduate □ Graduate □ Diploma □ Post-Secondary □ Secondary □

3. i) Do you have managerial experience?

Yes □ No □

ii) If yes, how many years of managerial experience you have in production/supply chain/operations management?

1 year or less □ 02 – 05 years □ 06 – 10 years □ 11-15 years □ 16 years above □

iii) Do you have managerial experience in electrical and electronics or ICT industry?

Yes □ No □

iv) If yes, how many years of managerial experience you have in production/supply chain/operations management in electrical and electronics or ICT industry?

1 year or less □ 02 – 05 years □ 06 – 10 years □ 11-15 years □ 16 years above □

4. Types of organization (based on paid up capital):

Foreign-based Multinational Company □, please specify country of origin___________________
Malaysian owned Multinational Company □ Malaysian Medium Enterprises □
Malaysian Small Enterprises □

5. What category of product your organization produces?

Consumer Electronics □ Industrial Electronics □ Electrical Products □ ICT □
Electronics Components □

6. Types of certification your organization registered to:

ISO 9001:2001□ ISO 14001□ Sirim MS □
others, please specify____________________

7. Location of business operation:

Penang Cybercity □ Kulim High Tech Park □
Petaling Jaya Free Trade Zone □ Technology Park Malaysia □
Shah Alam Industrial zone □ Melaka Industrial Area □
Others, please specify ______________________

8. Number of employees in your organization:

1- 19 □ 20 - 50 □ 51 - 150 □ 151 - 500 □ 501 – 1000 □ more than 1000 □

9. Number of years that your organization has been operating?

less than 3 years □ 3-5 years □ 6-10 years □ 11-15 years □
16-20 years □ 21- 30 years □ more than 30 years □

10. Last 3 Financial Year's Average Annual Sales

Less than RM 1 million □
Between RM 1 million to RM 5 million □
Between RM 5 million to RM 20 million □
Between RM 20 million to RM 50 million □
Between RM 50 million to RM 100 million □
Between RM 100 million to RM 500 million □
Between RM 500 million to RM 1000 million □
More than RM 1000 million □

11. Your organization is __________in this business alliance:

buyer □ supplier □

12. For how many years has the business alliance been operating? ___________ Years

13. If your organization is the *buyer* in the business alliance, name top 5 organizations that your organization buys from:

1. ________________________
2. ________________________
3. ________________________
4. ________________________
5. ________________________

14. If your organization is the *supplier* in the business alliance, name top 5 organizations that your organization supplies to:

1. ________________________
2. ________________________
3. ________________________
4. ________________________
5. ________________________

Thank you very much for your assistance and co-operation to participate in this research