Exploring Supply Chain Collaboration of the Manufacturing Firms in China

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work 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 work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

Meihua Gu

12/10/2016
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Abstract

In the past three decades, China has become the manufacturing hub of the world through its robust economic development momentum. Since the outbreak of the financial crisis in 2008, however, the Chinese manufacturing industry has suffered an unprecedented slowdown while the world economy has experienced only sluggish progress. Studies reveal that the low value-adding, labour-intensive, export-oriented development model of the Chinese manufacturing industry has become inappropriate and requires upgrading. As many leading world manufacturing firms have engaged in sophisticated supply chain collaboration (SCC) initiatives to enhance their competitive edge, it has become vital for Chinese manufacturing firms to embark on SCC to retain competitiveness.

The present study explores how effectively SCC is being implemented by electrical and electronic (E & E) manufacturing firms in China, through the identification of key elements and major barriers. It also attempts to develop a capability-based strategic framework to aid Chinese manufacturing firms to improve their collaborative capability so as to enhance competitiveness.

This thesis integrates insights from multiple theoretical perspectives, including Agency Theory (AT), Social Exchange Theory (SET), Extended Resource Based View (ERBV), and Institutional Theory, to enable a broader understanding of the implementation practices of SCC by Chinese manufacturers. A multiple-case study method was used to collect data from four leading E & E manufacturers in China for analysis.

The findings of this study reveal some unique characteristics of SCC in China. Various Western SCC practices are partially imitated by Chinese manufacturing firms (CMFs) to maximize their own short-term benefits at the expense of overall SC performance and efficiency. The collaborative capabilities of CMFs, manifested in objective alignment, SC partnering, information sharing, process integration, and collaborative synchronization, are in general not mature. Existing institutional barriers, such as traditional Chinese culture, lack of trust, and insufficient government effort and innovation, are found to exert significant negative influences on the implementation of SCC initiatives.
In an effort to help the industry achieve advanced synchronization capabilities, a capability-based strategic framework has been proposed, which depicts how the key elements and major barriers can impact on the successful implementation of collaborative initiatives. This framework can serve as a comprehensive guide for CMFs to make continuous improvement in this regard.
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List of Acronyms

AT  Agency Theory
B2B  Business-to-business
B2C  Business-to-consumer
CEO  Chief Executive Officer
CMF  Chinese Manufacturing Firm
CPFR  Collaborative Planning Forecasting and Replenishment
CRM  Customer Relationship Management
DP  Demand Planning
E & E  Electrical and Electronics
EDI  Electronic Data Interchange
ERBV  Extended Resource Based View
ERP  Enterprise Resource Planning
eSCM  Internet-enabled Supply Chain Management System
GDP  Gross Domestic Product
IO  Inventory Optimization
IOS  Inter-organizational Information Systems
IoT  Internet of Things
IT  Information Technology
JIT  Just-in-time
JIT-P  JIT Purchasing
NPD  New Product Development
NT  Network Theory
OEMs  Original Equipment Manufacturers
PCB  Printed Circuit Board
POS  Point-of-sales
R&D  Research and Design
RBV  Resource Based View
RV  Relational View
S&OP  Sales and Operations Planning
SC  Supply Chain
SCC  Supply Chain Collaboration
SCM  Supply Chain Management
SCOA  Supply Chain Objective Alignment
SKU  Stock Keeping Unit
SNC  Secure Network Communication
SRM  Supplier Relationship Management
SPF  Synergistic Planning and Forecasting
TCE  Transaction Cost Economics
VMI  Vendor Managed Inventory
VP  Vice President
WMS  Warehouse Management System
CHAPTER 1  INTRODUCTION

This chapter provides a brief introduction of the thesis. Firstly, it states the rationale for the study and the research context, in which the importance of enhancing the SCC capabilities of CMFs is highlighted. Then, it develops the research questions and the key objectives, which will tackle the challenges or barriers associated with the successful implementation of SCC capabilities. Finally, it discusses the scope and the contribution of this study.

1.1 Motivation for This Study

During the past three decades, China emerged as the world’s second-largest economy, based on its continuous double-digit annual growth in gross domestic product (GDP) (Schuman, 2013). It is generally agreed that such an enormous economic boom is largely built upon a low-value-adding, labour-intensive, export- and investment-oriented development model (Li, 2012). However, in recent years, this powerful growth engine has experienced an obvious slowdown, owing in part to gradual exhaustion of all those once abundant resources. The deceleration in economic growth emits a clear signal that the low-value-adding development model is not sustainable in the long run (Zhang, 2014).

Suffering from a prolonged economic stagnation from 1800 to 1978, China’s industrialization process had almost come to a halt until the adoption of an open-door policy by the Chinese government in the early 1980s (Thomas, 2006). The production model of the manufacturing industry in China is regarded as having being primitive for a long time. The majority of the manufacturing companies originated in unsophisticated family businesses on a small scale, and scattered widely across different regions (Zhang, 2012). Products produced were usually low in added value, and manufactured with outdated technology and low efficiency.

As international competition intensifies due to globalization, the CMFs are being compelled to pursue higher levels of operational excellence in order to maintain their competitive advantage. Clearly, a more intensive development model characterized by
high added-value, improved efficiency and enhanced innovative capabilities has to be fostered. To achieve this, an unprecedented transformation of the Chinese manufacturing industry will be needed.

As a result of China’s one-child policy introduced in 1979 to reduce the rapid growth in population, the pools of cheap workforce filling the assembly lines of factories are drying up (Li, 2013; Collins, 2013). In 2010, the outbreak of labour suicides and large-scale strikes in multinational corporations resulted in significant labour wage increases (Berthelsen, 2010). Subsequently, labour cost in China has become much more expensive by comparison with its Asian neighbours such as Vietnam, Thailand and India (Wang et al., 2010). Although Chinese workers earn less than US$1 per hour, their income is significantly higher than that of workers in other developing countries. For example, in Vietnam, workers receive less than half the wage of their Chinese counterparts (Bradsher, 2008). Consequently, many foreign firms have adopted a “China+1” strategy by building an additional production base in another, lower-cost Asian country (Toloken, 2013; Yang, 2012). In recent years, labour shortage in coastal areas of China has become a common phenomenon (China Daily, 2011). Apparently, the idle and cheap workforce in China is rapidly diminishing. Therefore, for the Chinese manufacturing industry, more advanced manufacturing approaches, with increased excellence in management of the supply chain (SC), have to be sought in lieu of cheap labour, in order for the industry to maintain its long-term attractiveness.

Furthermore, the competitiveness of China’s exports has dramatically deteriorated due to the occurrence of financial crises in the US and Europe, which have further weakened the global demand (Pettis, 2012). As a result, the once flourishing and fully occupied Chinese manufacturing industry is now struggling with issues of excess production capacity, and even survival, in a viciously competitive business environment.

Multiple challenges, such as surging raw material prices, the strong urge for sustainable business, and lack of investment and innovativeness, have left manufacturing firms with very little profit margins (Eloot et al., 2013). For example, it is reported that the profit of making an iPhone for Apple by original equipment manufacturers (OEMs) is less than US$1, which only accounts for 0.5 per cent of the selling price, while the total profit for each iPhone for Apple can be up to 58.5 per cent of the selling price (Beijing Daily, 2012). If the manufacturing firms in China continue to focus merely on pure
assembly and stay at the point on Stan Shih’s ‘smiling’ curve with the lowest value, they can no longer provide a profitable return in the long run (Shih, 2005, p. 213-215). To maintain its competitive position in the global market, the Chinese manufacturing industry has to climb up from the bottom of the smiling curve to participate in a wide range of supply chain management (SCM) initiatives to export more skill-intensive, technology-oriented and high-value goods and services.

During the past decade, SCC is increasingly perceived as the key driving force of effective supply chain management (Horvath, 2001) and the ultimate core capability to survive inexorable competition (Sanders and Premus, 2005). SCC involves two or more individual corporations working together to attain greater success than can be achieved in isolation (Daugherty et al., 2006; Simatupang and Sridharan, 2004). Forming external collaborations becomes a viable strategy to compete in a dynamic global environment (Simonin and Ruth, 1998).

By engaging in various SCC initiatives, many world leading corporations have enjoyed superior advantages, such as improvement of efficiency, effectiveness and market positions (Min et al., 2005), improved customer service (Ellinger, 2000), increased sales, lower product inventories, higher order fill rates, faster cycle times, improved forecast accuracy, and lower system expense (Fliedner, 2003). Through joint effort, collaborating partners can achieve operational excellence and create synergies, thereby generating competitive advantages (Bowersox et al., 2005; Simatupang and Sridharan, 2004). Consequently, SCC can be leveraged by Chinese manufacturers as a possible source of competitive edge.

However, the SCM capability of the Chinese manufacturing sector is still nascent (Chen and Yang, 2003). Many world-class best practices have not been well implemented or even recognized by most Chinese companies (Daly and Cui, 2003; Huettner and Song, 2007a). For example, less than 10 per cent of the companies use formal sales and operations planning (S&OP) processes (Handfield and McCormack, 2005), which percentage is significantly less than that for companies in developed countries.

Supply chain visibility is a rarity in Chinese manufacturing firms (Handfield and McCormack, 2005). Timely, accurate and reliable information across the entire supply chain, to enable quick response to market demand and efficient distribution, is usually
not available (Ganster, 2009). Owing to the lack of visibility, it is very hard for Chinese manufacturers to forecast downstream demand and control unstable upstream supply (IT168, 2008).

A high level of demand-forecast accuracy is rarely achieved by Chinese manufacturers (Byrne, 2006). Since there is a lack of training and education in supply chain operations, Chinese manufacturers have difficulty in coping with unsynchronized fluctuations in demand from customers or supplies from suppliers, which can result in excess inventory or high rates of stock-out (Feuling, 2008; IT168, 2008).

Overall acceptance of new information and communication technologies by Chinese manufacturing corporations remains quite low. Only a few major companies, such as Lenovo, Haier and Huawei, have embarked on implementation of a supply chain management system, including Enterprise Resource Planning (ERP) and just-in-time (JIT), for their business processes from 2004 onwards (IT168, 2008). Feuling (2008) points out that many Chinese companies still track activities such as raw material order placement and production scheduling by hand, or transfer data over the phone.

Higher utilization of inter-organizational technologies needs to be enforced for purposes such as maximizing data visibility, making global business decisions quickly and correctly, tracking demand in real time, and enhancing flexibility and responsiveness (Byrne, 2006). However, the astute application of advanced technologies is hampered by the reality that very few personnel exist in any part of the country with the requisite training and knowledge to implement ERP, JIT, total quality management, or other sophisticated logistics systems (Daly and Cui, 2003). By and large, the SCM competency of the Chinese manufacturing sector is far from outstanding, and needs to be significantly improved. Leveraging SCC capability can be a viable path for CMFs to improve efficiency and retain competitiveness.

1.2 Research Context

While tremendous benefits of SCC are widely mentioned in the literature, the exact nature and constructs of SCC are not properly elucidated. Most managers are uncertain about what constitutes SCC, what inhibits extensive SCC, and how successful SCC can be achieved. As a result, there are empirical evidences showing that, in practice,
progress of SCC is often slow or fails to live up to expectations (Frankel et al., 2002; Barratt, 2004; Holweg et al., 2005; Bowersox et al., 2003; Kampstra et al., 2006; Fawcett et al., 2008a; Hyland, 2002).

There are many plausible explanations for this phenomenon. They include lack of understanding about the concept of SCC (Barratt, 2004; Holweg et al., 2005; Simatupang and Sridharan, 2004; Ellinger et al., 2006; Fawcett et al., 2007), weak management skills and capabilities to remove various barriers to SCC (Hyland, 2002; Gulati et al., 1994; Spekman et al., 2002; Vereecke and Muylee, 2006; Kampstra et al., 2006), and underestimation of the required, substantial changes of attitude, mindset and organizational architectures (Liedtka, 1996; Daugherty et al., 2006; Gulati et al., 1994; Fawcett et al., 2008b; Fawcett et al., 2012; Bowersox et al., 2003).

First of all, the body of knowledge explicating the concept and dimensions of SCC is sketchy (Bowersox et al., 2003). Many of the problems concerning SCC are due to a lack of understanding of what collaboration actually implies (Barratt, 2004), since the definitions of SCC vary considerably (Holweg et al., 2005; Simatupang and Sridharan, 2004). The slow progress to date is closely related to the difficulty of internal and external integration (Holweg et al., 2005). Studies such as Ellinger et al. (2006) and Fawcett et al. (2007) highlight the prevalence of limited knowledge about the collaborative process through which companies leverage internal and external resources to produce distinctive customer value. In short, an improved understanding of the notion and attributes of SCC is urgently required.

Secondly, an examination of prior literature shows that SCC management skills and capabilities of managers are inadequate to mitigate various barriers. The concept of SCM has not been fully operationalized by businesses (Spekman et al., 1998), and managers do not understand the proper approaches for organizing a variety of alliances (Gulati et al., 1994). Consequently, the SCC endeavours of many corporations are often unorchestrated (Vereecke and Muylee, 2006). Similarly, Fawcett et al. (2012) highlight that only a small number of managers have the anticipated management capabilities to orchestrate complementary resources and competencies along the supply chain. Of those firms that claim to be involved in collaboration, what most of them can do is provide visibility (Hyland, 2002), which is insufficient for the realization of the full potential of collaborative advantages. SCC can end up being a failure if it is not
implemented properly (Kampstra et al., 2006). Many managers remain unclear about what the major barriers to SCC are and how to manage SCC effectively by overcoming multiple obstacles. As such, an investigation into the major barriers to SCC is essential for better adoption of SCC initiatives.

Thirdly, previous research has paid little attention to the challenges and substantial changes of attitude, mindset and organizational structures (Liedtka, 1996) required for the successful adoption of SCC. Collaborative efforts often fail because critical long-term details are overlooked (Daugherty et al., 2006). Supply chain partners often remain opportunistic, and view collaboration as prisoner’s dilemma situations (Gulati et al., 1994), which means that each member suspects that the other will get a larger share of benefits through opportunistic behaviour. Fawcett et al. (2008b) also stress that some managers are conservative and unwilling to develop true mutually advantageous collaborative relationships. Although some companies indicate their involvement in cross-organizational collaboration, they tend to apply adversarial strategies, which often lead to aggressive price squeezing (Bowersox et al., 2003). Fawcett et al. (2012) conclude that very few corporations have been able to realize the substantial cultural and structural transformation necessary for advanced collaboration. Some even revert to hostile strategies. It appears that many managers have underestimated the scope and breadth of SCC. Therefore, further research on SCC, to facilitate clearer understanding about the challenges and the appropriate attitude and mindset required for successful SCC, is essential for companies to fully exploit the exceptional advantages of collaboration in their supply chains.

A review of existing academic literature shows that comprehensive research on the SCC of CMFs is currently unavailable. Most existing studies provide a very brief introduction to the development of SCM in China (Zhao et al., 2007; Jhangiani and Stocking, 2006; Feuling, 2008; Tornquist, 2009; Easton, 2003; Ganster, 2008; Pyke et al., 2000; Huang and Tan, 2012; Chen and Yang, 2003; Byrne, 2006; Ganster, 2009; Li et al., 2009), whilst others focus on particular aspects of SCC, such as logistics competencies (Jiang and Prater, 2002; Jahns, 2007; Li and Lin, 2006; Rahman and Wu, 2011; Daly and Cui, 2003; Lau and Wang, 2009; Lau and Zhang, 2006), information sharing (Du et al., 2012; Ye and Wang, 2013), buyer-supplier relationships (Chen et al., 2010), risks in China’s supply chain (Carbone, 2004), the SC planning process
(Huettner and Song, 2007b), SC order fulfillment (Huettner and Song, 2007a), CPFR of the Chinese retail industry (Wang et al., 2005), supply chain hurdles in China (Huffman, 2003), RFID technology adoption (Lin and Ho, 2009), SC competitiveness (Song and Chatterjee, 2010), the collaborative operations reference model for the regional manufacturing industry in China (Han and Chu, 2009), and cooperative behaviour (Li et al., 2011). However, very limited scholarly research has been conducted involving a thorough investigation of the initiatives and the constructs of SCC between Chinese manufacturers and their SC partners.

As a result, the state-of-the-art of SCC between Chinese manufacturers and SC partners remains largely unknown. Owing to the lack of knowledge on SCC, most of the SC managers in CMFs have little idea about the notion of SCC (Daly and Cui, 2003), not to mention the key elements of and major barriers to the implementation of SCC between Chinese buyers and suppliers. Such managers generally do not possess the management skills and capabilities for the adoption of SCC initiatives (Feuling, 2008; Chen and Yang, 2003). Therefore, a comprehensive research investigating the contemporary status of SCC of Chinese manufacturers, and the key elements of and major barriers to SCC between Chinese manufacturers and SC partners, is essential for the improvement of management skills of practitioners in China.

Although the concepts of SCM, supply chain integration (SCI) and SCC have been evolving rapidly from the 1980s onwards, and are widely accepted by scholars, industrial professionals and Western firms, they are relatively new to CMFs. There is a lack of detailed frameworks and concrete recommendations for CMFs to engage in collaborative endeavour. Spillan et al. (2013) claim that the existing frameworks of SCM developed in the context of practices in Western countries are independent of culture, and should therefore be appropriate for Chinese firms from a theoretical perspective. However, their views might not be shared by practitioners in China, due to many differences in setting. Consequently, implementation of SCC in Chinese firms might be more difficult than in those well-developed, Western firms.

The existing frameworks of SCC might not be appropriate for Chinese companies for at least three reasons. Firstly, based on a systematic review of literature, the existing frameworks of SCC (e.g. Simatupang and Sridharan, 2005a; Fawcett et al., 2008a; Matopoulos et al., 2007; Forme et al., 2007; Singh and Power, 2009) have largely
originated from developed countries. Some of these frameworks hold one or more implicit assumptions, such as that partnerships are desirable, inter-organizational information systems (IOSs) are mature, and SC processes are streamlined and integrated. Some of those frameworks are too complicated for managers to comprehend or too simple to capture the nature of SCC. Some researchers have pointed out that certain existing frameworks are difficult even for Western practitioners to implement (Ireland and Bruce, 2000; Frankel et al., 2002; Johnston et al., 2004), let alone their Chinese counterparts.

Secondly, the industrial and logistics foundation of CMFs is very weak when compared with that of their Western peers (Pyke et al., 2000). Thirdly, the unique institutional environment in China is very distinctive compared to Western nations. As many scholars have revealed, the institutional condition plays a significant role in the adoption of SCM practices (Liu et al., 2010; Su et al., 2008; Cai et al., 2010; Yeung et al., 2009; Shi et al., 2012). Although the basic concept of SCC might be generic for a cross-cultural audience in some senses, the framework of SCC for Chinese firms could be idiosyncratic given the fundamental impact of institutional factors. Fourthly, the knowledge of SCC and management capability of supply chain managers in Chinese firms is insufficient. A very complicated framework with numerous steps might be beyond the capability of such managers to comprehend.

Based on the above considerations, the development of a new framework of SCC for CMFs is necessary. This new framework has to provide full consideration of the current level of SCM and SCC in China. It also has to provide detailed guidance for Chinese manufacturers that engage in various levels of SCC with different domestic and international partners in diverse ways. Furthermore, it has to take the above-mentioned institutional factors into consideration, and provide strategic guidelines for manufacturing firms to mitigate the negative impact of institutional barriers, so that the superior merits of SCC can be capitalized.

In the present research, the Chinese electrical and electronic (E & E) manufacturing industry is selected for investigation and analysis of SCC between manufacturers and their SC partners. This industry is selected because of the size and significance of the E & E manufacturing industry to the Chinese economy. While China developed to become the world E & E manufacturing centre in the early 2000s, its E & E
manufacturing industry has encountered severe rounds of factory closure since the outbreak of the financial crisis in 2008 (Chan, 2011). SCM of the Chinese E & E manufacturing industry is facing enormous challenges, such as sharply rising costs, shortened product life cycle, volatile demand, and a great deal of inventory overstock (Cho, 2006). Thus, embarking on SCC initiatives to foster a truly agile SC is critical for E & E manufacturers to improve efficiency and retain competitive advantages. Consequently, multiple Chinese E & E manufacturing firms are examined in this research.

1.3 Statement of Research Questions

The present research attempts to answer the following, main research question:

*How effectively is supply chain collaboration being implemented by the manufacturing firms in China?*

To answer the main research question, the following subsidiary questions are raised:

1. What are the unique characteristics of SCC in China?

2. What are the key elements of and the major barriers to SCC implementation in China?

3. What strategic framework can be formulated to enhance SCC capabilities of the Chinese manufacturing firms?

1.4 Research Objectives

The research objectives for the present study are outlined as follows:

1. To investigate the unique characteristics of SCC of the manufacturing firms in China, through case studies and in-depth interviews with practitioners.

2. To investigate the key elements of and the major obstacles to the implementation of SCC by the manufacturing firms in China.

3. To develop a framework to facilitate extensive supply chain collaboration of
the Chinese manufacturing firms.

1.5 Scope of the Study

The present study will focus only on identifying the key elements of and major obstacles to the implementation of SCC in the Chinese E & E manufacturing industry. This is believed to be critical to helping China to improve SCC capabilities, and hence maintaining competitiveness and its leading position in global manufacturing. The purpose is to develop a framework for cross-organizational collaboration that takes into consideration the distinctiveness of the Chinese economic, political and cultural environment. Successful industry-wide collaboration can improve SCM capability of the entire industry, thereby reducing total SC cost. While further research may develop strategies and detailed measures to implement the changes involved in SCC, the scope of this study is confined to revealing the main dimensions and major barriers, through case studies and in-depth interviews, for the E & E manufacturing firms in China.

1.6 Contribution of the Research

The major contributions of the research are as follows:

1. This study provides a comprehensive view of the unique landscape of SCC in China. The implementation of SCC in the Chinese manufacturing industry is much more complex than a simple adoption of the concepts and models from Western developed markets. The idiosyncratic Chinese institutional factors play an indispensable role in the application of SCC practices to, and hence improvement of SCM capabilities of, the entire industry.

2. This research employs multiple theoretical perspectives to investigate whether SCC is effectively implemented to remove current SC inefficiencies in the Chinese manufacturing industry. Few studies in operations management and supply chain management have integrated economic, social, competency and institutional paradigms to account for SCC in developing countries.

3. Taking the E & E manufacturing industry in China as an example, the present study is an effort to investigate how advanced SCC can be achieved, from both
the manufacturers’ and the suppliers’ perspectives. It also attempts to make a comparison of the collaborative initiatives between international and domestic manufacturing firms.

4. The study develops a holistic strategic framework to indicate the key elements of and the major barriers to SCC of the CMFs. It also depicts the interaction between each construct of the framework. It is expected to serve as a guide for practitioners to improve SCC capabilities.

5. The results of this study can help manufacturers to identify factors that affect the success of strategic collaboration. They can also provide proper direction for developing robust and effective collaborative relationships between supply chain partners.

1.7 Chapter Summary

This chapter has provided an overview of this research. It has stated the motivation for this study and explained the research context in detail. It has also highlighted the research questions and the objectives followed by the scope and the contribution of this study. The next chapter of this thesis will review the literature relevant to SCC and the related conceptual framework.
CHAPTER 2  LITERATURE REVIEW

This chapter firstly reviews the theoretical paradigms underpinning collaborative activities of CMFs. Furthermore, it reviews the literature on SCM, SCI, SCC and SCC of CMFs. Then, a tentative framework of SCC in China is proposed. Subsequently, all key elements of and the major barriers to SCC in China are also discussed.

2.1 Theoretical Perspectives

A combination of various theories is employed by this study to provide explanation for the implementation of SCC practices in China. Owing to the unprecedented complexity and diversification of SCC behaviour, Halldorsson et al. (2007) claim that “a unified theory of SCM” is currently unavailable. Chen et al. (2009a) also point out that it is almost impracticable to give thorough elucidation to a SC phenomenon with a single theory, owing to the complexity of today’s SC interactions.

Existing literature shows that multiple perspectives have been suggested or adopted by researchers in SCM areas. For example, Halldorsson et al. (2007) recommend that multiple perspectives, including Transaction Cost Economics (TCE), AT, Network Theory (NT) and Resource Based View (RBV), can be employed in conjunction to enable a holistic view of SCM in practice. Ketchen Jr. and Hult (2007) discuss how several theoretical perspectives, such as TCE, AT, NT, Institutional Theory and RBV, jointly discriminate traditional supply chains from best value chains. Cao and Zhang (2010) employed a mixture of TCE, RBV, Relational View (RV) and Extended Resource-Based View (ERBV) to explore how SCC can be used to generate collaborative advantage through improved firm performance. Chen et al. (2009a) also borrow four theoretical perspectives in an effort to develop a comprehensive framework of SCI. Halldorsson et al. (2007) address the issue that, based on the specific circumstance, one theory can be chosen as the prime explanatory perspective, supplemented with one or several other theoretical perspectives. As such, many believe that a single theory is insufficient to elucidate the distinctive nature and richness of SCC structures and activities. In other words, an integration of various theories from multiple disciplines is essential for the present research.
2.1.1 Agency Theory

AT describes the negative (traditional AT) and positive (contemporary AT) relationships between two parties, in which the principal delegates authority to the agent (Eisenhardt, 1989a; Mitnick, 1975). An agency problem arises when coordinating parties have conflict goals (Jensen and Meckling, 1976) and different attitudes towards risk (Eisenhardt, 1989a). More specifically, in agency relationships, the principal generally strives to minimise the agency costs, such as by specifying, rewarding and monitoring, and policing the agent’s behaviour, while the agent attempts to maximise rewards and moderate principal control (Fleisher, 1991). The principal and the agent may also prefer different actions due to their different risk preferences (Eisenhardt, 1989a). AT assumes that both shareholders and managers who are agents for the shareholders act in their own self-interest (Jensen and Meckling, 1976). Subsequently, these parties may act opportunistically when there is information asymmetry. In order to govern the relationship between the principal and the agent, AT aims to design the most efficient contract, including the right mix of behavioural and outcome-based incentives to motivate the agent to act in the interests of the principal (Eisenhardt, 1989a; Logan, 2000). In other words, the field of AT describes relationships that reflect the fundamental agency arrangement of a principal and an agent who are involved in collaborative performance, but who have divergent goals and contradictory attitudes toward risk.

The traditional AT perceived the purpose of organizations is profit maximization in free markets, under the assumption that contracts were impeccably monitored and enforced at zero cost (Beckert and Zafirovski, 2006). The contemporary AT perceived an organization as an institution among other institutions in an ecosystem. Based on this latter assumption, competition for limited resources and profit maximization is eventually replaced by collaboration and coordination in an aim to create more value.

AT can be applied to SCM studies from both the positive collaboration perspective and the negative conflict perspective. In the traditional negative AT, the theory contends that conflict between agents and principals can create an abusive relationship in which the agent abuses its power throughout the SC (Ketchen and Hult, 2007). Thus, this theory might help us understand under what conditions a SC member is likely to attempt to exploit other members (Ketchen and Hult, 2007). The contemporary view of AT is
suitable for justification of the opportunistic behaviour under a rational system view. In the new institutionalism environment, the fundamental purpose of organizations is survival and value creation through collaboration, and agents seek to gain competitive advantage through coordination with their environment.

Recently, increasing numbers of SCM scholars use AT to explain how members within the SC manage risks, align incentives and structure relationships (Halldorsson and Skjott-Larsen, 2006; Norrman, 2008; Plambeck and Gibson, 2010). Fayezi et al. (2012) carried out a comprehensive review pertaining to how AT has been applied, to illuminate relationship development within the SC, and reached the conclusion that AT provides valuable insights for the relationship arrangement within a SC. Norrman (2008) borrowed AT to shed light on how incentive alignment issues can be improved through various solutions. Plambeck and Gibson (2010) propose that a blend of AT, TCE and SET can be adopted to achieve more collaborative relationships between SC members which yield greater collaborative competitiveness. It can be seen that AT has been used to progressively enlighten different SCM issues.

2.1.2 Social Exchange Theory

While some theoretical paradigms, such as RBV, TCE and AT, have been widely adopted within the literature, the recent prevalence of SET is mirrored by its frequent application to the studies of SC relationships (e.g. Griffith et al., 2006; Narasimhan et al., 2008; Wu et al., 2014; Liao, 2008). SET is largely utilized to examine collaborative issues among SC partners, such as the development of the SC relationship (Griffith et al., 2006), inter-firm information sharing (Wu et al., 2014; Zouaghi et al., 2012), knowledge sharing (Bock and Kim, 2002; Liao, 2008), sourcing arrangement (Narasimhan et al., 2008), strategic alliance (Sambasivan et al., 2013), and buyer cooperative actions (Zhang et al., 2009).

SET states that individuals or organizations are motivated to interact with others with the anticipation of a reward from the interaction, and strive to maximize benefits and minimize costs when engaging in an exchange (Homans, 1958; Emerson, 1976). While economic exchange theory concerns extrinsic benefits, SET concerns intrinsic rewards (Blau, 1964). The social elements of exchange vary from the economic elements of
exchange, given that the obligations of the exchange members are often unspecified and the criteria of measuring each member’s contributions are ambiguous (Masterson et al. 2000). The social exchange rewards do not have a precise price for a single, quantitative medium of exchange. Hence, social obligations are unable to be assessed on a transaction-by-transaction basis (Masterson et al., 2000).

SET comprises a set of propositions exhibiting the tenet of social exchange (Blau, 1964). Firstly, the success proposition of SET highlights that, the more often a particular interaction is rewarded, the more likely a member in an exchange is to repeat that interaction again (Homans, 1961). The reward proposition states that, the more valuable to a member of an exchange is the result of the member’s action, the more likely the member of the exchange is to perform the action again. Furthermore, the value proposition contends that rewards gain value when deprived. In addition, the aggression proposition describes that, when an exchange member’s action does not receive the expected reward, or receives unexpected punishment, the exchange member will aggressively avoid the action in the future. Lastly, the rationality proposition argues that, in choosing between actions, a member to an exchange will choose the one for which the value of the reward multiplied by the probability of receiving the reward is greater.

The SET is applicable for SCM and can be a valuable mechanism when analysing buyer-supplier relationships (Holthausen, 2013). It is especially appropriate for the selection of supplier strategies and for decision making about how to manage suppliers. A purchaser should fully consider social norms such as trust and commitment when participating in an exchange, so that a trustful exchange relationship can be nurtured for a long-term continuation of the relationship. Becoming a favourite customer, instead of simply being a regular customer or even an exit customer, enables a supplier to provide privileged treatment and an ensured supply, which leads to reduced uncertainty of supply. SET suggests that establishing a long-term relationship through increased trust and commitment outweighs the costs of supplier management.

2.1.3 Extended Resource Based View

While RBV argues that a firm’s internal resources and capabilities are a source to
generate sustained competitive advantage (Barney, 1991; Day, 1994; Collis and Montgomery, 1995; Wernerfelt, 1984), it is widely acknowledged as being insufficient to explain how external resources are linked to competitiveness of the organizations. Many scholars have attempted to incorporate network resources to extend RBV (Gulati, 1998; Gulati, 1999; Lavie, 2006). Gulati (1998) introduces a social network perspective and emphasizes the profound importance of social networks to organizational performances. Lavie (2006) examined the applicability of RBV in the networked environment and attempt to extend RBV to incorporate network resources of interconnected firms. He concludes that network resources could contribute to the rents extracted from alliance networks.

The main tenet of ERBV is that cross-boundary resources create competitive advantage (McEvily and Zaheer, 1999; Das and Teng, 2000; Dyer and Nobeoka, 2000; Eisenhardt and Schoonnoven, 1996; Ireland et al., 2002; Lavie, 2006; Lewis et al., 2010). McEvily and Zaheer (1999) propose that a firm’s embeddedness in social networks could be an important source of competitive edge. Das and Teng (2000) put forward a resource-based theory of strategic alliances, and argue that firms could leverage alliances to maximize the value of inter-partner resources. Similarly, studies such as Eisenhardt and Schoonnoven (1996) and Ireland et al. (2002) posit that the formation of alliances yields competitiveness. By examining the network-level knowledge sharing process between Toyota and its suppliers, Dyer and Nobeoka (2000) argue that a dynamic learning capability would require a company to go beyond the firm’s boundaries to create competitive advantage. Lewis et al. (2010) analyse the evolution of competitive advantage and contend that external resources could generate long-term competitive advantage, together with classic resources. In essence, ERBV advocates that boundary-spanning activities play an important role in business performance and in generating competitive advantage.

ERBV has been used by researchers to explain that inter-organizational collaborative initiatives between SC partners improve competencies, and therefore generate competitive advantage (Arya and Lin, 2007; Rungtusanatham et al., 2003; Kale et al., 2000; Dyer, 1996; Dyer et al., 2001; Xu et al., 2014; Oliveira et al., 2003; Lai et al., 2012). For instance, Arya and Lin (2007) and Dyer et al. (2001) demonstrate that organizations could enhance their capabilities by participating in a collaboration
network. Rungtusanatham et al. (2003) put forward the view that SC linkages with suppliers and customers could improve the operational performance of a firm. Kale et al. (2000) argue that collaboration with alliance partners could be critical to inimitable competencies. Dyer (1996) examine the interfirm relationships in the auto industry, and indicate that specialized supplier networks could be a source of competitive advantage. Xu et al. (2014) further present that inter-organizational resources, such as SCI, could improve business performance significantly. Thus, ERBV is borrowed by the present study to be one of the theoretical lenses to investigate SCC of CMFs.

2.1.4 Institutional Theory

Institutional Theory highlights that the institutional environment is one of the fundamental determinants of economic growth (North, 1997). Institutions are composed of ‘formal rules (laws, constitutions, regulations and rules), informal constrains (norms of behaviour, conventions and self-imposed codes of conduct) and their enforcement characteristics’ (North, 2003, p. 2). Scott (2004) contends that institutional forces, including natural economic laws, and cultural, social and political processes, shape an organizational system and set various guidelines for social behaviour, thereby generating an impact on economic development. Institutions form the incentive structure that may either encourage or restrain productive activity (North 1997; Williamson, 2000). Likewise, Khalil et al. (2007) claim that a proper legal and economic environment, such as with property rights and economic freedom, can address economic growth. Rossiaud and Locatelli (2010) further emphasize that the institutional configurations stimulate companies in terms of their exploration and production strategies. By and large, institutional factors have significant impact on economic activities.

Owing to the existence of various institutional constraints in China, institutional reform is especially crucial for the adoption of SCC. Liu et al. (2010) examine how institutional pressure incentives the firm to adopt an Internet-enabled Supply Chain Management System (eSCM), through a survey of 131 Chinese firms. They conclude that institutional pressures, including a firm’s competitive status and the powerful firms’ influence, are positively related to eSCM adoption intention. Su et al. (2008) evaluate the SCM activities of Chinese firms from the institutional perspective, and state that the level of
SCM of the Chinese logistics industry is affected by institutional factors such as the influence of planned economics, lack of professionals, and inefficient use of information technology (IT) systems. Cai et al. (2010) explore the relationship between institutional environment and the development of trust and information integration of CMFs, in terms of the aspects of legal protection, government support, and the importance of guanxi. They highlight that both government support and guanxi affect information sharing and collaborative planning considerably. Some scholars have realized the importance of examining institutional forces while investigating SCM activities (Yaibuathet et al., 2008; Zhang and Dhaliwal, 2009). Institutional theorists advocate that the implanting of SCM practices in different institutional contexts might not be successful (Yeung et al., 2006; Shi et al., 2012). Therefore, it is proper for the present research to include an institutional perspective, given the vital impact of a complex and uncertain institutional environment on the development of SCC in China.

Overall, in view of the key elements of SCC proposed in the present study, four theories, i.e. AT, SET, ERBV and Institutional Theory, are considered priorities for this research. While both TCE and AT provide an economic approach for understanding SCC behaviours, TCE addresses dependence relationships of SC members by emphasising the SC member’s cost minimization efforts (Williamson, 2002). TCE exclusively translates the many trade-offs within a make-or-buy decision into cost. On the contrary, AT provides guidelines for inter-organizational incentive alignments to achieve efficient relationships (Eisenhardt, 1989a). Therefore, AT is the preferred economic perspective, which provides an explanation for the collaborative nature of SCC.

Supply chain relationships not only incorporate economic elements explicated in a contract but also incorporate elements of social exchange (Johnston et al., 2004). Incorporation of SET could provide substantial insights for understanding complex and dynamic SCC activities, and allow the present study to consider both financial and non-financial measures for SC performance, in a complementary manner.

Furthermore, it is necessary to encompass an ERBV perspective owing to the fact that inter-organizational collaboration is an important source of competitive advantage. In addition, given the unique institutional environment in China, incorporating institutional constraints into the decision-making process is essential for the successful implementation of SCC by Chinese manufacturers. As such, Institutional Theory is
indispensable for the present study. On the whole, four theoretical lenses are borrowed to account for the complex nature of SCC practices of Chinese E & E manufacturing firms by this study.

2.2 Supply Chain Management

The concept of SCM first appeared in the logistics literature in the 1980s (Cooper and Ellram, 1993). Since then it has received substantial attention among scholars and practitioners (Lambert et al., 1998). Initially, it was introduced to facilitate the physical transfer of products and the management of inventory of the entire SC (Bechtel and Jayaram, 1997; Ellram and Cooper, 1990), as the traditional approach of mitigating uncertainty by accumulating excess inventory and capacity turned out to be frustrating and expensive (Ellram and Cooper, 1990; Stevens, 1989; Stevens, 1990).

While the term SCM continued to be used interchangeably with logistics by some scholars and practitioners, the differences between the two terms were gradually clarified by researchers (Cooper et al., 1997; Croxton et al., 2001; Lummus et al., 2001). They consider that SCM goes beyond logistics and incorporates activities and processes, such as information system integration, demand management, design of products, coordination of processes, and planning and scheduling, that are traditionally not included in the definition of logistics (Cooper et al., 1997; Lummus et al., 2001).

A review of the SCM literature shows that various definitions were provided by scholars from different disciplines (see Table 2.1). Bechtel and Jayaram (1997) reviewed literature from multiple disciplines and identified various schools of thought on SCM. Their findings reveal that there is confusion about what SCM essentially means. Ellram and Cooper (1993) explain that SCM is an innovative Western approach to coordinating SC activities while maintaining many features of the Japanese Keiretsu approach, such as stability and efficiency. Hewitt (1994) opines that SCM includes not only flow of materials and information but also the processes that enable this flow. Stevens (1990) contends that SCM spans from the source of supply to the point of consumption. Ellram and Cooper (1990) emphasize that SCM uses a system approach to perceive the supply network as a whole entity rather than a set of separated units. Some researchers consider that SCM is an effective approach to managing inventory by focusing on the
determination of optimal location and quantity of inventory to be held for the entire SC

Table 2.1 Definitions of SCM

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<th>Definitions of SCM</th>
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<tr>
<td>‘... deals with the total flow of materials from suppliers through end-users.’</td>
<td>Jones and Riley (1987, p. 97)</td>
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<td>‘... to synchronize the requirements of the customer with the flow of material</td>
<td>Stevens (1989, p. 3)</td>
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<td>from suppliers in order to effect a balance between what are often seen as the</td>
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<td>conflicting goals of high customer service, low inventory investment and low unit</td>
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<td>cost.’</td>
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<td>‘... as an integrative philosophy to manage the total flow of a distribution channel from supplier to the ultimate user.’</td>
<td>Ellram and Cooper (1990, p. 2)</td>
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<td>‘... is a strategic management tool used to enhance overall customer satisfaction that is intended to improve a firm’s competitiveness and profitability.’</td>
<td>Giunipero and Brand (1996, p. 30)</td>
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<tr>
<td>‘... as the delivery of enhanced customer and economic value through synchronized management of the flow of physical goods and associated information from sourcing to consumption.’</td>
<td>Lalonde (1997, p. 7)</td>
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<td>‘... is the integration of key business processes from end user through original suppliers that provides products, service, and information that add value for customers and other stakeholders.’</td>
<td>Lambert et al. (1998, p. 1)</td>
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<td>‘...is a continuously evolving management philosophy that seeks to unify the collective productive competencies and resources of the business functions found both within the enterprise and outside in the firm's allied business partners located along intersecting supply channels into a highly competitive, customer-enriching supply system focused on developing innovative solutions and synchronizing the flow of marketplace products, services, and information to create unique, individualized sources of customer value.’</td>
<td>Ross (1998, p. 9)</td>
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<td>‘... is systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purpose of improving the long-term performance of the individual companies and the supply chain as a whole.’</td>
<td>Mentzer et al. (2001, p.11)</td>
</tr>
<tr>
<td>‘... is the collaborative design and management of seamless value-added processes to meet the real needs of the end customer. The development and integration of people and technological resources as well as the coordinated management of materials, information, and financial flows are critical to successful supply chain integration.’</td>
<td>Fawcett and Magnan (2004, p. 68)</td>
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<tr>
<td>‘... is the design and management of seamless, value-added processes across organizational boundaries to meet the real needs of the end customer.’</td>
<td>Fawcett et al. (2007, p. 8)</td>
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<td>‘... is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirements.’</td>
<td>Simchi-Levi et al. (2008, p. 1)</td>
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(Ellram and Cooper, 1990; Jones and Riley, 1987; Cooper and Ellram, 1993; Skjoett-Larsen, 1999). Lambert et al. (1998) define SCM as a new method of coordinating business and relationships with other SC players so as to achieve overall business
process excellence. Overall, SCM is a broad concept incorporating various variables.

Multiple frameworks of SCM have been proposed by researchers to promote better understanding of the concept and facilitate wider implementation of SCM by practitioners (Hewitt, 1994; Lambert et al., 1998; Croxton et al., 2001; Min and Mentzer, 2004; Chen and Paulraj, 2004; Kotzab et al., 2011). For example, Hewitt (1994) developed a conceptual framework to demonstrate the evolvement of SCM practices from being perceived as a narrow term to a much broader concept. Lambert et al. (1998) operationalized the SCM framework and indicated that managing the SC would involve three closely inter-related elements: 1) the SC network structure; 2) the SC business processes; and 3) the management components. Min and Mentzer (2004) answered the research call of Mentzer et al. (2001) for empirical research to offer a general theoretical framework of SCM for the development and testing of measurement scale. Chen and Paulraj (2004) attempted to develop a research framework that could improve understanding of SCM and promote both theoretical and empirical examination of the critical SCM variables. Kotzab et al. (2011) developed a conceptual model and provided a set of measurement scales to operationalize the constructs included in the model. From the above, it can be seen that a sizeable effort has been exerted to promote a better understanding of SCM.

A well-executed SCM is considered to lead to higher operational efficiency and effectiveness, superior firm performance, and stronger competitive advantage (Jones and Riley, 1987; Ellram, 1991a; Cooper and Ellram, 1993; Hewitt, 1994; Lalonde, 1997; Clendenin, 1997; Lambert et al., 1998; Fawcett and Magnan, 2004; Croxton et al., 2001; Langley and Holcomb, 1992; Ross, 1998; Tan et al., 2002; Hsu et al., 2011). Ellram (1991b) posits that SCM offers a tremendous opportunity for firms to enhance competitive advantage, but not for every situation. Cooper and Ellram (1993) state that the involvement in SCM can help reduce inventory and improve customer service. Hewitt (1994) advocates a process-oriented SC redesign for operational efficiency and effectiveness, so as to retain channel-wide cost reduction and excellent customer service. While various important benefits of SCM are cited in the extant literature, most of this literature focuses mainly on theoretical discussion of the concept (e.g. Giunipero and Brand, 1996) and provide limited empirical evidence.
2.3 Supply Chain Integration

While SCM is receiving increasing attention, a more integrated perspective has been advocated by academics and practitioners to overcome the functional conflicts and retain more significant benefits (Stevens, 1989; Hines, 1993; Houlihan, 1985; Houlihan, 1988; Bowersox and Morash, 1989; Scott and Westbrook, 1991; Morgan and Monczka, 1996; Daugherty et al., 1996). Kim (2006) claims that a firm needs to seek integration with others for valuable resources and technological know-how. Consequently, the firm is able to concentrate on their core capabilities and become an expert in a particular area (Simchi-Levi et al., 2003; Lummus et al., 2008).

As most definitions of SCI are seemingly unclear and not widely accepted (Pagell, 2004), many scholars have attempted to provide a more comprehensive definition for the notion (see Table 2.2). Essentially, SCI is the internal and external collaborative activities with SC partners to achieve more efficient and effective operational performance. Scott and Westbrook (1991) suggest that SCI is a new strategic tool for the enhancement of SC effectiveness. While Pagell (2004) considers that SCI is the foundation of SCM, Morgan and Monczka (1996) and Fawcett and Magnan (2002) argue that SCI is the second level of SCM. Mentzer et al. (2001) contend that SCI is essential to the implementation of SCM practices.

SCI has been classified by academics in various ways, the majority taking an internal-external perspective (Morash and Clinton, 1998; Pagell, 2004; Droge et al., 2004; Kim, 2006; Das et al., 2006; Chen et al., 2009a; Chen et al., 2009b; Kim, 2009, Richey et al., 2009, Flynn et al., 2010; Wong et al., 2011; Danese and Romano, 2011; Droge et al., 2012). Internal integration is to eliminate functional conflicts and inefficiencies, and promote inter-functional cooperation (Pagell, 2004; Flynn et al., 2010; Morash et al., 1997). External integration refers to the coordination and streamlining of the interactions and flows spanning organizational boundaries (Morash and Clinton, 1998).

Arguably, internal integration is a prerequisite for subsequent external integration (Stevens, 1990; Bowersox and Closs, 1996; Croxton et al., 2001), whereas external integration can be an incentive for internal integration (Morash and Clinton, 1998). Daugherty et al. (1996) claim that both internal and external integration are necessary to facilitate chain-wide connections and improve SC efficiency. Many academic
researchers emphasize the importance of engaging in both internal and external integration to obtain superior performance (Stevens, 1989; Richey et al., 2010; Stank et al., 2001; Chen et al., 2009b; Danese and Romano, 2011, Morash and Clinton 1998). Stevens (1990) posits that development of an integrated SC involves four stages, namely baseline, functional integration, internal integration, and external integration.

Table 2.2 Definitions of SCI

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<td>‘‘··· a useful method for evaluating alternative channel flow arrangements in terms of efficiency and customer satisfaction. They emphasize the importance of the need to integrate market flow strategies for overall customer satisfaction.’’</td>
<td>Bowersox and Morash (1989, p. 66)</td>
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<td>‘‘··· a multidimensional process where interaction and collaboration have unique, significant contributions.’’</td>
<td>Kahn and Mentzer (1998, p. 56)</td>
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<td>‘‘··· the extent to which separate parties work together in a cooperative manner to arrive at mutually acceptable outcomes. Accordingly, this definition encompasses constructs pertaining to the degree of cooperation, coordination, interaction and collaboration.’’</td>
<td>O’Leary-Kelly and Flores (2002, p. 226)</td>
</tr>
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<td>‘‘··· a process of interaction and collaboration in which manufacturing, purchasing and logistics work together in a cooperative manner to arrive at mutually acceptable outcomes for their organization.’’</td>
<td>Pagell (2004, p. 460)</td>
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<tr>
<td>‘‘··· activities that acquire, share, and consolidate strategic knowledge and information with parties outside the immediate organization.’’</td>
<td>Swink et al. (2007, p. 148)</td>
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<td>‘‘··· linking major business functions and business processes within and across companies into a cohesive and high-performing business mode.’’</td>
<td>CSCMP Glossary of Terms (2013, p. 187)</td>
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<td>‘‘··· a set of continuous restructuring activities aimed at seamlessly linking relevant business processes and reducing redundant or unnecessary processes within and across firms.’’</td>
<td>Chen et al. (2009a, p. 29)</td>
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<td>‘‘··· the management of various sets of activities that aims at seamlessly linking relevant business processes within and across firms and eliminating duplicate or unnecessary parts of the processes for the purpose of building a better-functioning supply chain.’’</td>
<td>Chen et al. (2009b, p. 66)</td>
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<td>‘‘··· the co-ordination and management of the upstream and downstream product, service, financial and information flows of the core business processes between a focal company and its key supplier (and potentially the supplier’s key suppliers) and its key customer (and potentially the customer’s key customers).’’</td>
<td>Naslund and Hulthen (2012, p. 496)</td>
</tr>
<tr>
<td>‘‘··· the alignment, linkage and coordination of people, processes, information, knowledge, and strategies across the supply chain between all points of contact and influence to facilitate the efficient and effective flows of material, money, information, and knowledge in response to customer needs.’’</td>
<td>Stevens and Johnson (2016, p. 22)</td>
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SCI is also collapsed into other dimensions by researchers. For example, Frohlich and Westbrook (2001, p. 185) examined supplier and customer integration strategies and employed “arc of integration” to represent the direction and degree of integration activity. Their research demonstrates that, the wider the degree of arc of integration with both suppliers and customers is, the stronger the association with performance.
improvement. Swink et al. (2007) categorize SCI into four types, comprising strategic customer integration, strategic supplier integration, product-process technology integration, and corporate strategy integration. Their study shows that each type of integration activity has unique pros and cons.

Many studies report that SCI competencies have positive impact on firm performance. Most of these studies indicate the significant impact of SCI on the improvement of firm performances, such as cost reduction, efficiency, effectiveness, quality, flexibility, customer service, innovative capability, and problem solving capabilities (Daugherty et al., 1996; Pagell, 2004; Stank et al., 2001; Lambert, et al., 2004; Droge et al., 2012; Danese, 2013; Chen et al., 2009a; Stank et al., 2001; Richey et al., 2009; Flynn et al., 2010; Wong et al., 2011). Danese and Romano (2011) examine the interactions between customer and supplier integration, and highlight the importance of implementing customer and supplier integration simultaneously to improve performance.

While SCI has been advertised to have a sizeable positive impact on firm performance and competitiveness, the achievement of those benefits can be a significant challenge. Bowersox et al. (2000) and Fawcett and Magnan (2002) opine that realizing neither internal nor external integration is an easy task. Richey et al. (2010) suggest that a company’s capability to reap the benefits of SCI depends on how successfully SCI practices can be implemented. The impact of SCI on firm performance is also moderated by a company’s business strategy and demand variance (O’Leary-Kelly and Flores, 2002). Danese and Romano (2011) highlight that supplier and customer integrations have to be implemented simultaneously to improve performance. Kim (2009) argues that, even if a firm possesses excellent SCM practices and competitive capabilities, it has to engage in close strategic alignment and coordination with SC partners to make the improvement of firm performance possible.

Multiple studies show that there is limited empirical evidence of extended integration with SC members (Fawcett and Magnan, 2002; Lambert et al., 1998; Bagchi et al., 2005; Mejza and Wisner, 2001; Naslund and Hulthen, 2012). Fawcett and Magnan (2002) indicate that corporations rarely have developed extensive SCI with SC members beyond the first tier. After twenty-five years of evolution, Stevens and Johnson (2016) re-examined the state-of-the-art of SCI, and demonstrate that the
majority of firms have failed to capitalize on the full advantage of this practice.

A possible explanation for this phenomenon is that various barriers hindering integration have to be overcome before the benefits of SCI can be reaped. Morgan and Monczka (1996) state that integration is not a simple merger. It requires substantial changes in vision, culture and routines. Hines (1993) suggests that integration of the material value pipeline requires the primary functions of individual firms to work together as a unified team and the traditional arms-length silos to be removed. Firms also must be open to goal alignment, frequent communication, and partner interdependence (Richey et al., 2009; Forslund and Jonsson, 2009). Performance advancements are not guaranteed if SCI initiatives are not accompanied by the adoption of a coherent mix of SCM practices (Danese et al., 2006; Kim, 2006). Recently, Stevens and Johnson (2016) conclude that the biggest challenge associated with the success of SCI is the joint effort by SC partners to act collaboratively to operationalize SC orientation and ensure measurable, sustainable improvement on a consistent basis. All these antecedents have to be nurtured and enhanced through continuous effort so that successful integration can be achieved.

2.4 Supply Chain Collaboration

Supply chain collaboration has been strongly advocated by academics and practitioners during the past two decades. Collaboration is described as an inter-organizational process where participants work collectively to make investment, share information (Simatupang and Sridharan, 2002), resources, awards and responsibilities, and make decisions and solve problems jointly to achieve common goals (Stank et al., 2001; Soosay et al., 2008). Other similar definitions are provided by other academics (See Table 2.3). Fawcett et al. (2008a) point out that collaboration is more than the traditional management of transactions for cost efficiency, but is, rather, leveraging close relationships for continuous improvement and innovation. Lambert et al. (1999) emphasize that collaboration is an evolving journey, instead of a static process, which sits between arm's-length relationships and joint ventures. Basically, SCC involves multiple collaborative activities such as information sharing, joint decision making, and synchronization of operations for the achievement of mutual goals so as to retain distinctive advantages.
Table 2.3 Definitions of SCC

<table>
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<th>Definitions of SCC</th>
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<tr>
<td>‘…a complex interaction of business and interpersonal activities whose purpose is to achieve mutually beneficial goals.’</td>
<td>Spekman et al. (1996, p. 350)</td>
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<tr>
<td>‘…a process of decision making among interdependent parties. It involves joint ownership of decisions and collective responsibility for outcomes.’</td>
<td>Liedtka (1996, p. 21)</td>
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<td>‘…an affective and volitional process where departments work together with mutual understanding, common vision, and shared resources to achieve collective goals.’</td>
<td>Kahn and Mentzer (1998, p. 55)</td>
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<td>‘…two or more chain members working together to create a competitive advantage through sharing information, making joint decisions, and sharing benefits which result from greater profitability of satisfying end customer needs than acting alone.’</td>
<td>Togar and Sridharan (2002, p. 19)</td>
</tr>
<tr>
<td>‘…Two or more independent companies work jointly to plan and execute supply chain operations with greater success than when acting in isolation.’</td>
<td>Simatupang and Sridharan (2002, p. 19)</td>
</tr>
<tr>
<td>‘…Diverse entities working together, sharing processes, technologies, and data to maximize value for the whole group and the customers they serve.’</td>
<td>Foster and Srikanth (2005, p. 31)</td>
</tr>
<tr>
<td>‘…diverse entities work together by sharing processes, technologies, and data to try to maximize value for the whole group and their customer.’</td>
<td>Daugherty et al. (2006, p.63)</td>
</tr>
<tr>
<td>‘… the ability to work across organizational boundaries to build and manage unique value-added processes to better meet customer needs.’</td>
<td>Fawcett et al. (2008a, p. 93)</td>
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To better understand the concept, researchers have further classified SCC into different levels. For instance, Whipple and Russell (2007) identify three major types of collaborative relationships: Type I is collaborative transaction management; Type II is collaborative event management; and Type III is collaborative process management. The Type I relationship is a limited collaboration that involves high volume data exchange and operational task alignment, such as Vendor Managed Inventory (VMI). The Type II relationship is a developing form of collaboration that incorporates decision-making at a tactical level, as in initial CPFR. The Type III relationship is an advanced form of collaboration that requires strategic collaboration that relies on knowledge sharing and joint decision-making, such as advanced CPFR. This classification will be used by the present research to distinguish the different levels of collaboration between CMFs and their SC partners (see Figure 2.1).

Spekman et al. (1998) depict that the development of collaboration moves from cooperation, coordination to collaboration. Cooperation is the threshold level of interaction characterized by the exchange of limited valuable information and the engagement of some partners in longer-term contracts. Coordination requires the exchange of specified workflow and information, which enables JIT and Electronic Data
Interchange (EDI). Collaboration demands high levels of mutual trust, commitment and information sharing among SC partners.

Figure 2.1 Different levels of SCC

In a similar vein, Kampstra et al. (2006) divide SCC decisions into three loops: the strategy loop, the change loop, and the control loop. They argue that the step-wise development of SC performance can be described as being from communication, through coordination and intensive collaboration, to partnerships. Danese (2007) classifies SCC into communication, limited collaboration and full collaboration, based on the depth of collaboration and number of interaction units involved in collaboration. Skjoett-Larsen et al. (2003) argue that SCC can be implemented in various ways. In line with variation in scope and depth, they group SCC into three levels: basic CPFR, developing CPFR, and advanced CPFR.

The basic motivation for collaboration among chain members is to exploit profit-making opportunities that cannot be realized alone while customers are more demanding and competition is intensified (Hoyt and Huq, 2000; Leeuw and Fransoo, 2009). Through collaboration, firms are able to enhance their efficiency through resource pooling, taking advantage of complementary skills, and information sharing. Whipple and Frankel (2000) propose that strategic collaboration facilitates buyers and suppliers to combine their individual strengths and work cooperatively to eliminate non value-adding activities and enable better performance. Ireland and Bruce (2000) consider that inventory accumulation is actually the driver of collaboration. This is because collaboration is an effective way to diminish the “bullwhip” effect of inventory and become more responsive to a turbulent market (Holweg et al., 2005). Furthermore,
some other issues, such as cost reduction, technological uncertainty, shorter product life-cycles, an ability to deal with uncertainty, and new product development (NPD) (Hoyt and Huq, 2000; McIvor and McHugh, 2000), are also key impetuses for SCC.

The immense prevalence of collaboration is mainly owing to the remarkable benefits it may provide to organizations. As Bowersox et al. (1992) reports, strategic logistics alliances among partners, and even competitors, lead to better customer satisfaction, and lower distribution and storage cost. Chan et al. (2004) contend that SCC is able to provide faster customer responsiveness, enhancement of flexibility for unstable market conditions, and reduction of inventory buffer stock. In addition, according to the findings from interviews with 23 managers in ten logistics organizations, Soosay et al. (2008) assert that a collaborative relationship is able to integrate operations for improved effectiveness together with embarking on both radical and incremental innovation. With a higher degree of collaboration and a timelier sharing of information between retailer and manufacturer, greater stability makes inventory planning more accurate (Fliedner, 2003). Overall, collaboration is believed to be an effective SCM tool enabling various benefits for all members, to achieve cost reduction, quality enhancement, and operation acceleration through streamlining cross-organizational processes (Simatupang and Sridharan, 2005a).

Furthermore, scholars have obtained some empirical support for successful application of collaborative practices. As Parks (2001) reports, Wal-Mart, the first retailer implementing collaborative initiatives together with Warner-Lambert and Sara Lee, achieved great results in terms of improved in-stock levels, shortened leading times, lower on-hand inventory, streamlined production cycles, and increased sales. Based on a survey of companies in New Zealand, Simatupang and Sridharan (2005b) prove that SC members who had higher levels of collaboration practices could achieve better operational performance. Stank et al. (2001) conducted a survey among manufacturing, wholesale/distributing, and retailing industries in North America, and reveal that both internal and external collaborations affect logistics service performance significantly. In addition, in a survey of Korean firms carried out by Ha et al. (2011), they report that collaboration had considerable impact on logistics competency. By contrast, Vereecke and Muylle (2006) find that increased collaboration is associated with higher performance but that the improvements are not always significant.
Despite the enormous advantages that might be produced by SCC, substantial practical difficulties inherent in the application of SCC have been widely acknowledged and discussed (Gulati et al., 1994; Spekman et al., 1998; Johnston et al., 2004; Barratt, 2004; Holweg et al., 2005; Fawcett and Magnan, 2002; Fawcett et al., 2008b; Bowersox et al., 2003; Beth et al., 2003; Ellinger et al., 2006; Min et al., 2005; Daugherty et al., 2006). For example, Barratt (2004) points out that collaboration is not unproblematic. Some assert that true adaptive and synergistic SCC is scarce (Fawcett et al., 2008b; Beth et al., 2003; Ellinger et al., 2006; Min et al., 2005). Some posit that collaborations often fail because many SC members are concerned that, while they cooperate faithfully, others could act opportunistically for their own interests. Consequently, the mutual suspicion often ends up in a lose-lose situation (Gulati et al., 1994; Fawcett et al., 2008b). Bowersox et al. (2003) and Spekman et al. (1998) highlight that many firms understand the strategic importance of SCC but easily revert back to adversarial and aggressive cost-cutting policies for immediate benefits. Clearly, adopting the concept of SCC requires substantial change from traditional management skills and a new mindset (Fawcett et al., 2010).

Various barriers inhibiting successful SCC have been reported by researchers. They include lack of collaborative and strategic planning, difficulties of real-time information exchange, substantial investment, no shared target, lack of trust, and unequal distribution of risk and reward (Barratt and Oliveira, 2001; Chan et al., 2004; Fliedner, 2003; Ramesh et al., 2010). However, there is a trend toward greater collaboration. Matopoulos et al., (2007, p. 177) argue that, ‘despite the barriers that potentially deteriorate collaboration among companies for many industries all over the world, collaboration is becoming more of a necessity than an option’. Barratt (2004) found that failure of SCC is caused by a lack of understanding of what collaboration really means. Consequently, important enablers, such as developing front-end agreement (Barratt, 2004), top management involvement (Sandberg, 2007), mutual trust (Ha et al., 2011), and information technology and sharing (Mason-Jones and Towill, 1998; Lummus and Vokurka, 1999), are crucial for successful collaboration.

2.5 Supply Chain Collaboration of Chinese Manufacturers

Since China’s adoption of economy reform and open-door policy, Chinese
manufacturers have convinced the world of their prominent competency in production. However, their SCM capability is comparatively weak in comparison to Western firms (Pyke et al., 2000). The global manufacturing sector has evolved towards a focus on process innovation and unprecedented collaboration across the SC (Zhu, 2012). To be successful in the global marketplace, Chinese manufacturers must engage in cross-border collaboration to keep abreast of their leading global peers, without delay. Multiple obstacles to substantial improvement of logistics efficiency and SC capability of Chinese manufacturers do exist, and many firms do not realize the importance of SCC (Huang et al., 2012). Nevertheless, some Chinese manufacturers have demonstrated growing interest in SCC with up- and down-stream partners. The level of adoption of SCC practices by Chinese manufacturers can be gauged from aspects of information sharing, customer relationship management (CRM) and supplier relationship management (SRM), synchronized demand forecasting, and supply planning.

In China, indigenous suppliers are often reluctant to provide detailed information about their operations (Carbone, 2004). Huettner and Song (2007b) estimate that only 12 per cent of local Chinese companies electronically share demand information and inventory data in real time with SC partners, compared to 50 per cent in India. China is short of accurate information and tracking systems, which shortage is largely caused by the lack of standardization in data collection and the sharing of information (MacDonald, 2004; Daly and Cui, 2003). Wang et al. (2013) report that only very few large Chinese retailers have the ability to build information platforms to support CPFR for real-time and interactive collaboration.

Chinese manufacturers are not sophisticated in CRM. This can be reflected in poor communication between sales groups and their end customers, and low customer satisfaction rate. CRM practices such as customer focus groups and automated cross-selling are not widely implemented in China to enhance customer satisfaction (Huettner and Song, 2007a). Chinese manufacturers are also incompetent in tracking and controlling key customer order management performance metrics, hence overall customer satisfaction remains at a low level.

The interaction between Chinese manufacturers and suppliers remains at transactional relationship stage (Handfield and McCormak, 2005). Liu et al. (2008) contend that most
manufacturers do not have a supplier evaluation system and have no ability to identify valuable suppliers as long-term partners. Low price is the only criterion for supplier selection in China. Only a very few firms realize the importance of building up strategic collaborative relationship with suppliers. However, long-term close cooperation between or among small- to medium-size enterprises has emerged as a recent trend (Wang and Shi, 2007). This type of network collaboration allocates the industrial-related manufacturing process into a few geographically-clustered companies through subcontracting, strategic alliances and service contracts. Some Chinese manufacturers even provide financial and technology support to enhance a supplier’s capability in aspects of quality control, production procedure, and assembly line improvement.

Chinese manufacturers are in an adolescent phase in terms of collaborative demand forecasting and supply planning. Not many Chinese companies have formal forecasting, demand management, or a market intelligence unit for capacity and inventory planning (Handfield and McCormak, 2005; Wang et al., 2013). Huettner and Song (2007b) point out that only 17 per cent of the manufacturers surveyed in their study deployed synchronization of supply and demand practices in China, and that wide application of this initiative is restricted by deficiency in the use of advanced technologies.

In sum, compounded with insufficient implementation of information and communication technologies such as EDI, ERP systems and the CPFR model, SCC practices in China are not diffused broadly, being only confined to limited leading enterprises and regions. In the aim to integrate with customers and suppliers for collaborative SC planning, improved real-time information visibility, enhanced responsiveness to market demand, and reduced cost, a large-scale collaborative effort involving Chinese manufacturers, logistics firms and the Chinese government is necessary.

### 2.6 Building the Framework for Supply Chain Collaboration in China

Following the above overview of the current status of SCC in China and an understanding of the importance of a high level of collaboration among the various parties in the SC to benefit the manufacturing industry of China, a tentative conceptual
framework for SCC based on the work of Simatupang and Sridharan (2005a) and customized for the unique economic, political and cultural situation in China is proposed (see Figure 2.2). At this stage, it is merely a framework to start with and shows only the key elements of SCC involved and the institutional obstacles identified in the literature. Detailed relationships among these elements and obstacles have yet to be determined. Upon investigation of the current status and the views of practitioners, it is hoped that the proposed framework can be refined by revising some of the elements and barriers or incorporating new ones that have not been identified in the literature. It is also anticipated that the inter-relationship between key elements and barriers can be revealed. Consequently, a more extensive and meaningful framework will be developed upon analysis of the findings from the case studies of this research.

Five key elements for SCC of the CMFs are proposed in the framework. These elements comprise, objective alignment, information sharing, SC partnership, process integration, and collaborative synchronization. These are believed to be critical in enhancing both the efficiency and responsiveness of the entire SC. There are also six institutional obstacles to SCC of the manufacturing industry in China, taking into account its distinctive economic, political and cultural environment. These comprise, lack of awareness of SCC, lack of trust, weak information sharing capability, transactional relationship, insufficient government effort and innovation, and guanxi. It is believed that these obstacles can significantly impact on the success of SCC. Proper improvement measures and strategies in response to those obstacles can then be formulated in the long run to facilitate SCC, and hence leverage SCC competency as a new source of competitive advantage.
Figure 2.2 A proposed framework of SCC in China

Institutional Barriers to SCC

- Lack of Awareness of SCC
- Lack of Trust
- Weak Information Sharing Capability
- Transactional Relationship
- Insufficient Government Effort and Innovation
- Guanxi

SCC of Manufacturing Firms in China

- SC Objective Alignment
- SC Partnership
- Information Sharing
- Process Integration
- Collaborative Synchronization

Key Elements of SCC
2.5.1 Key Elements of Supply Chain Collaboration in China

2.5.1.1 Supply Chain Objective Alignment (SCOA)

Supply Chain Objective Alignment is the extent to which firms perceive the possibility of realizing compatible objectives that are mutually beneficial (Eliashberg and Michie, 1984). It is the achievement of mutuality of interests between parties where they have common aims, values, and expectations (Jap, 2001). More specifically, with aligned SC objectives, both parties are intrinsically inspired to engage in cooperative actions, such as constructive communication, mutual adaptation, and high commitment, so that exchange outcomes can be enhanced (Jap and Anderson, 2003). Basically, aligned SC objectives provide direction for both parties while they participate in frequent communication of objectives and bargaining of the division of profits, obligations and risks.

By developing aligned SC objectives between the parties, the incentive for opportunism can be restrained, which therefore promotes collaboration (Eisenhardt, 1989a). Each party is less likely to behave opportunistically but more likely to behave supportively if it understands that fulfilling the other party’s requests won’t undermine its own benefits. This is because a perception is developed that what is favourable for the counterpart will also be beneficial for the party. Thus, SC objective alignment enables less incentives to perform opportunistically, and prevents the occurrence of suspicion within both parties. As a result, appropriately designed incentive mechanisms are essential to alleviate concerns and encourage cooperativeness. In the absence of any common goals, firms will have no incentive to participate in collaborative actions (Samaddar et al., 2006).

As Lambert et al. (1999) suggest, SC partners should agree on a shared vision for SCM as well as appropriate business operations underpinning the vision, thereby bonding firms through fairly distributed revenues. Evidently, greater objective alignment is a more effective mechanism to maintain close cooperation on track for realization of strategic expectations, and to facilitate long-term future collaboration (Jap and Anderson, 2003).
2.5.1.2 SC Partnering

Driving by intensified market pressure caused by shortening product life cycle, technology sophistication, and volatile consumer demand, there is strong recognition among both researchers and practitioners that the traditional adversarial manufacturer-supplier relationship needs to be turned towards a more cooperative partnership paradigm. Supplier partnering development is perceived as a source of competitive edge owing to it providing an opportunity to leverage suppliers’ critical resources and innovativeness through knowledge transfer (Dyer and Hatch, 2004), and possibly to lock-out competitors (Lambert et al., 1996). In particular, the long-term perspective of supplier partnering effectively inspires the suppliers to focus on mutual benefits instead of acting opportunistically (Williamson, 1998). As a result, it is able to create relational rents, which cannot be generated by a firm in isolation and can only be engendered through the joint activities (Dyer and Singh, 1998). Evidently, there has been a clear trend of shifting from a transactional arm’s-length relationship to a closer partnership among manufacturers and suppliers in the globalization era.

Various definitions of partnership are available in the existing literature. For example, Ellram and Cooper (1990) state that a partnership is a type of inter-firm relationship that is positioned in the middle of a continuum ranged from a discrete arm’s-length relationship to vertical integration. Lambert et al., (1996, p. 2) define a partnership as ‘a tailored business relationship based on mutual trust, openness, shared risk and shared rewards that results in business performance greater than would be achieved by the two firms working together in the absence of partnership’. Similarly, Ellram and Hendrick (1995, p. 41) contend that ‘partnership is an on-going relationship between two firms which involves a commitment over an extended period of time, the mutual sharing of information, as well as the risks and rewards of the relationships’.

It is difficult to offer a one-size-fits-all definition for partnership relationships in that definitions are context dependent (Johnstone et al., 2009). However, all definitions share some common characteristics such as sharing information, coordination of efforts, investment in dedicated assets, a joint decision-making process, allocation of risks and benefits, a long-term orientation, mutual trust and commitment, and a bilateral problem-solving attitude (Tuten and Urban, 2001; Sako et al. 1994; Dyer and Singh, 1998).
In light of previous research, successful supplier partnerships have been shown to have a positive effect on operational efficiencies and business performance. This includes enhancements in NPD, improvement of quality, cost reduction, lower inventory, shortened time-to-market, and better process technology adoption and innovation (Hartley and Choi, 1996; Johnston and Linton, 2000; Manohar and Narakesari, 1995). Consequently, through synergy of resources, supplier partnerships contribute significantly to business performance, thereby engendering competitive advantage.

Nevertheless, establishing a collaborative partnership with key SC partners is often difficult (Kim, 2006). Critical issues need to be carefully considered in the implementation of partnerships. Firstly, substantial resources, time and effort are required to be allocated for the development of partnerships (Simpson and Mayo, 1997). Secondly, radical changes in organizational strategies, norms, infrastructures, and operational processes have to be taken by both parties (Maheshwari et al., 2006). In addition, relationship capital such as mutual trust and commitment is an essential ingredient for the success of partnerships (Cullen et al., 2000). During the processes of the forming, nurturing and managing of partnerships, it is vital to administer all these issues judiciously.

### 2.5.1.3 Information Sharing

Information sharing refers to the extent to which critical and proprietary information is communicated to one’s SC partner. It is defined as the way in which SC members build up highly developed communication systems that are compatible with each other, to facilitate real-time and dynamic inter-firm forecasting and planning (Sanders and Premus, 2005). It also means the extent to which information flow across the SC occurs, how frequently information updates, and how accurate information is maintained (Teo and King, 1997; Lee and Whang, 2000; Wiengarten et al., 2010). In general, information sharing is to exchange essential information between SC partners to achieve real-time transmission and processing of data required for SC decision making.

The information to be shared usually includes ‘the availability of resources (capacity, inventory, funds and capability), the status of performance (time, quality, costs and flexibility), the status of process (forecasting, ordering, delivering, replenishing, and servicing), and the status of contract’ (Simatupang and Sridharan, 2002, p. 24).
Information technology provides a linkage amongst SC partners to allow seamless interaction at relatively lower cost. It serves as a systematized common platform enabling various firms along the SC to exchange information and synchronize activities for effective demand forecasting and planning (Sanders and Premus, 2005; Steckel, 2004). It enhances chain-wide transparency, thereby making more efficient operations and resource allocation possible.

SCI and SCC largely rely on the availability of an efficient and effective inter-firm IT (Richey et al., 2007; Sebastian and Lambert, 2003), and require more proactive sharing of real-time information by SC partners. Without a sufficient inter-firm information system, the transmission and processing of real-time and dynamic data cannot be realized for collaborative decision making (Kent and Mentzer, 2003).

While the availability of sophisticated and advanced inter-organizational IT is important, it is the quality, frequency and quantity of information that makes cross-organizational collaboration really meaningful (Sanders et al., 2011; Prajogo and Olhager, 2012). The quality of information is usually assessed across several dimensions, including accuracy, timeliness, completeness, accessibility and compatibility (Li and Lin, 2006). Provided with accurate and timely demand and performance information, a manufacturer is able to shorten NPD cycles, reduce production scheduling time, and decrease inventory obsolescence, resulting in greater responsiveness to customer needs (Ye and Wang, 2013). The real-time and detailed information exchange enables members within the collaborative network to diminish demand uncertainty and tackle decision-making difficulties (Simatupang and Sridharan, 2002). To enable the power of information sharing to be evident, the high quality information must be embedded in the business strategies, structures, processes and competencies (Sambamurthy et al., 2003), and be aligned with organizational incentives, objectives and decisions (Lee et al., 1997). In addition, providing high quality of information is likely to encourage partners’ willingness to release more proprietary information as a return (Whipple et al., 2002). Overall, only when advanced and sensitive information is made available by firms proactively, can performance differentials and collaboration of the entire SC be promoted.

The benefits of information sharing are widely cited by researchers and practitioners. As Johannessen et al. (2001) state, the practices of information acquisition, absorption,
and transformation have come to be perceived as a key enabler of competitive advantage of SC partners. This advantage is in that the release of confidential information can exert positive impact on SC performances such as improvement of SC efficiencies and customer satisfaction, removal of SC uncertainties, enhancement of SC responsiveness, and creation of new products with better values (Lee et al., 2010; Cachon and Fisher, 2000; Lee et al., 1997; Griffin and Hauser, 1996; Hung et al., 2011; Kim and Lee, 2010). More specifically, real-time information sharing makes it possible to streamline production arrangements and logistics activities, resulting in shorter order cycles and delivery flexibility and reliability (Cachon and Fisher, 2000). Furthermore, appropriate and competitive inter-organisational information sharing enables quick responses to changing customer demands and expectations (Hsu et al., 2008). In particular, the positive impact of information sharing on the elimination of the bullwhip effect could be demonstrated through real-time monitoring of consumer behaviour and detection of environmental changes (Lee et al., 1997). In addition, information on design, production capacity and capability, and customer requests, has to be shared between all departments and functions involved in NPD initiatives, so that a commercially successful product can be innovated (Griffin and Hauser, 1996). Consequently, the significance of information sharing to business success makes it one of the main precursors to the realization of SCC.

2.5.1.4 Process Integration

Process integration is defined as a continuous restructuring effort to connect business processes smoothly, and to simplify SC operations by eliminating redundant or unnecessary activities within and across organizations (Chen et al., 2009a; Stank et al., 2001; Frohlich and Westbrook, 2001; Stank et al., 2002; Shi and Liao, 2013). Consequently, a cohesive and high-performing business model can be developed (CSCMP Glossary of Terms, 2013). Process integration requires streamlining all fundamental business activities such as manufacturing, information sharing, cross-organizational logistics, and other major routines, into continuous sequences of daily business operations (Ray et al., 2004; Cannon and Perreault, 1999; Rodrigues et al., 2004). As a result, the operational linkages throughout the value stream are orchestrated to remove replication and redundancy, and to shorten lead time (Rodrigues et al., 2004; Stock et al., 2000), thus improving operation efficiency.
Simatupang and Sridharan (2002) point out that process integration helps resolve role conflict among SC members through assuming specific tasks and assigning certain responsibilities to each member. In other words, process integration is to facilitate internal and external organizations to work together harmoniously and coordinate tightly (Barki and Pinsonneault, 2005).

Chen et al. (2009b) proposes that connectivity and simplification are the two essential dimensions of process integration. Connectivity is needed to ensure that materials and information flow seamlessly throughout the chain and that organizations are closely interconnected at multiple levels (Lambert et al., 2005). Simplification refers to inter-functional unification and process standardization (Bowersox et al., 2003), which can be realized through establishment of common operational policies and procedures, to coordinate inter-organizational routines efficiently and effectively (Bowersox et al., 1999).

The objective of process integration is to triumph over competitors in price, speed, convenience and reliability; in this sense, the SC employs a strategy of total cost minimization and lean operations (Treacy and Wiersema, 1993). Corporations engaging in process excellence continuously exert great effort in optimal order fulfilment and best time-based performance, through minimizing operation costs, eliminating intermediate production steps, and standardizing practices and services.

The movement towards excellent SCM can be depicted in different stages of process integration (Stevens, 1989; Spekman et al., 1998). The initial stage of integration features cost minimization, frequent price negotiation, arm’s-length relationships, discrete functions, and fragmented SC. The medium stage of integration is features the signing of long-term contracts with a limited number of vendors, exchanging basic amounts of information, and coordinating specified workflow and information, which is usually accompanied by successful implementation of EDI or JIT systems (Germain et al., 1996) and application of time-phased planning to the manufacturing management. There is also a poor visibility of real consumer demand that needs to be aggregated (Stevens, 1989). The mature stage of integration features shared common vision, inter-organizational integration, well-managed master schedules, and joint decision making, underpinned by high level of mutual trust and commitment.
A large body of research has revealed a positive link between operation integration and performance improvement, in terms of cost reduction, higher flexibility, delivery speed, better quality, operation efficiency, faster new-product development, and customer satisfaction (Droge et al., 2012, Droge et al., 2004; Kim, 2013; Frohlich and Westbrook, 2001; Wong et al., 2011; Narasimhan and Kim, 2002; Swink et al., 2007; Flynn et al., 2010; Kim, 2006; Danese, 2013; Danese and Romano, 2011; Prajogo and Olhager, 2012). While manufacturing firms’ desire to make improvements, and various environmental drivers such as fast changing market demand, mass customization, shortening product life cycle and escalating competition, facilitate the wide adoption of operation integration (Richey Jr. et al., 2009), various barriers also exist to make internal and external integration difficult to implement and succeed (Richey Jr. et al., 2009). This difficulty is in that process integration requires new way of thinking or making radical changes to organizational structures and routines. Moreover, it is a dynamic process that involves continuous effort by the company (Chen et al., 2009a). If being unable to realize positive outcomes in a short period, the motivation for carrying on with drastic changes gradually diminishes (Richey Jr. et al., 2010). There are many other possible obstacles to successful process integration, including conflicting goals, lack of communication, lack of support of senior management, focus on short term as opposed to long term benefits, lack of SC visibility, and SC complexity issues (Ellinger et al., 2006; Barratt, 2004; Moberg et al., 2003; Pagell, 2004).

2.5.1.5 Collaborative Synchronization

Collaborative synchronization plays a central role in SCC activities across organizations. Usually, decision-making processes of chain members are not coordinated and are conflicting, thereby rarely coming to optimum solutions for the whole chain (Lee et al., 1997). In the aim to eliminate sub-optimized decisions, chain members need to orchestrate their SC activities in a collaborative manner. Collaborative synchronization is defined as the collective actions taken by chain members to align critical decisions at planning and execution levels, for optimizing overall SC performance and profitability (Simatupang and Sridharan, 2005a). Collaborative synchronization promotes SC members aggressively working together to manage inventories more efficiently and cost-effectively, thereby increasing customer satisfaction and business profitability by leveraging IT (Stank et al., 1999).
Collaborative synchronization, typically under the banner of CPFR, involves the purposive interchange of timely, specific, and accurate data between organizations, to formulate a single synchronized prediction of demand (McCarthy and Golicic, 2002; Petersen et al., 2005; Ramanathan and Gunasekaran, 2014; Daugherty et al., 2006; Nakano, 2009). More specifically, it requires sharing of promotion schedules, point-of-sales (POS) data, and inventory data, which enables shorter lead-times and integration between forecasting and replenishment processes. Subsequently, the improved forecasting accuracy promotes the better matching of supply to demand, thus avoiding overstock or out-of-stock situations.

Consistent, systematic and proper forecasting and planning initiatives impact on performance dramatically. The firms involved in CPFR initiatives report that they have increased sales, better fill rates (Cooke, 1998), and improved product availability, while achieving minimum inventory obsolescence, reduced out-of-stock occurrences and shorter cycle times (VICS, 2004), enhanced flexibility (Hadaya and Cassivi, 2007) and responsiveness (Petersen et al., 2005), minimum variance of any unexpected events such as forecasting errors and delays that disrupt chain performance (Lambert et al., 1998). Through inter-organisational streamlining and alignment, both SC visibility (Barratt and Oliveira, 2001) and the accuracy of demand forecasting are improved, if demand information is shared among SC partners (Lee et al., 2000). The promotional sales and introduction of new products is more likely to be successful if the decision is made collaboratively by retailers and suppliers (Ramanathan and Muyldermans, 2010; Ramanathan, 2012). In essence, collaborative synchronization improves firm performance significantly and provides them with great competitive advantages. Collaborative synchronization is the ultimate goal of various collaborative initiatives.

2.5.2 Institutional Obstacles to the Supply Chain Collaboration of Chinese Manufacturers

It is clear from the preceding discussion that the issue of enhancing SCM efficiencies in China cannot be resolved by simply transplanting SCC ideas that stem from successful Western market economies. The unique and extremely complex institutional environment in China needs to be fully considered before adopting any of the Western managerial initiatives. Based on the literature, six major obstacles, which are lack of
awareness of SCC, lack of trust, weak information-sharing capability, transactional relationship, insufficient government effort and innovation, and guanxi, were identified as the critical issues that have to be factored into the SCC equation.

2.5.2.1 Lack of Awareness of SCC

The concept of SCC remains new to the majority of Chinese manufacturers. Handfield and McCormac (2005) report that marketing and sales are the main focus of Chinese executives, while limited attention has been paid to collaborative initiatives such as SC planning. Daly and Cui (2003) also point out that various SCC arrangements are not widely adopted or even acknowledged by a large proportion of Chinese firms. Thus, SCC is not broadly recognized by Chinese companies, which would be expected to inhibit the implementation of SCC.

2.5.2.2 Lack of Trust

Trust refers to a firm’s belief that its SC partner will operate and make decisions generating positive outcomes for the firm, and therefore can be relied upon to fulfil obligations (Anderson and Narus, 1990). It will also choose to behave fairly when the possibility of exploitation emerges. Entrusted partner firms have faith in each other and would act in a predictable and mutually acceptable manner with an expectation of maintaining repetitive exchanges and a long-term relationship (Dodgson, 1993). A high level of trust can be perceived as a relational governance mechanism to foil opportunism in a collaborative relationship (Gulati, 1995). This is because trust can be viewed as a self-enforcing contract that mitigates the potential vulnerability between partners (Cavusgil et al., 2004). Trust can be perceived as a cornerstone of the strategic partnership (Spekman, 1988).

Sako (1997) categorizes trust into three types: contractual, competence, and goodwill trust. Contractual trust facilitates a mutual understanding between partners to adhere to a stipulated arrangement. Competence trust refers to the confidence that a SC partner is managerially and technically capable of completing a given set of tasks. Goodwill trust emerges when SC partners volunteer to behave in ways better than are specified in contractual agreements.

A lack of trust can be a significant barrier to the success of SCC initiatives. Distrusted
SC partners tend to increase protectiveness as a result of intensified fear of opportunism. In order to prevent potential opportunistic behaviour, the transaction costs of business activities escalate substantially, in that every transaction has to be scrutinized. Subsequently, the transaction costs, related to drafting very specific contract terms, time consuming negotiations and bargaining, complicated certification procedures, meticulous monitoring of performances, and frequent inspection of the quality of products, mount significantly (Stump and Heide, 1996). For instance, a manufacturer has to enforce and verify suppliers’ compliance with contract conditions owing to delays or defects in parts deliveries, resulting in production disruptions (Noordewier et al., 1990). The SCC practices that are employed to improve efficiency, effectiveness and productivity, such as VMI, cross-docking, and CPFR, eventually become ineffective. Moreover, a lack of trust is very likely to discourage information sharing (Zand, 1972; Liao et al., 2011) and knowledge transfer (Inkpen, 2000) between trading partners, because of concern about proprietary information and valuable knowledge that might be used opportunistically. Trust is an essential facilitator to make a partnership feasible and successful (Wong et al., 2005); and, vice versa, a lack of trust is a destructive factor that may disperse a partner relationship (Liu et al., 2010).

2.5.2.3 Weak Information-Sharing Capability

In the present study, information-sharing capability is defined as IT connectivity and willingness to share information. IT connectivity refers to an automated information system that enables information communication across organizational borders (Cash and Konsynski, 1985). It represents a company’s ability to use IT to collect, analyse and disseminate information, enabling rich information exchange, quick and reliable availability of data, and easy information access for SC members (Mukhopadhyay et al., 1995). IT provides the technological feasibility for application of modern SCI philosophies (Humphreys et al., 2001; Cao, 2007; Silveira and Cagliano, 2006). Insufficient IT connectivity of companies is one of the major barriers to realizing real-time and dynamic collaboration. Inadequate and fragmented IT makes it difficult for companies to exploit knowledge of shared information from their partners (Siau and Tian, 2004). Without the support of reliable inter-organizational IT, inaccurate information transmitted from end to end can result in enormous inefficiencies, such as excessive inventory, poorly arranged production schedules, misguided capacity plans,
poor customer service, and lost revenues (Lee et al., 1997). Lack of integrated IT can inhibit companies’ participation in information-sharing partnerships (Stefansson, 2002). Firms’ failure to utilize and integrate their IT with their strategic partners may lead to limited returns for their substantial investment on IT (Kim and Lee, 2010).

Moreover, the advantages brought by enormous investments in connectivity technologies can be offset simply by an unwillingness to share information. A company’s unwillingness to share information refers to a refusal to provide sensitive and valuable information frequently and genuinely to SC partners (Lee et al., 2000; Mendelson, 2000). Usually, companies tend to perceive information as a proprietary resource and are reluctant to release critical information (Williamson, 1988). When critical information regarding sales, inventory, forecasts, marketing, and strategic objectives is withheld, firms’ capabilities in decision making, coordination and performance tend to be significantly compromised (Fawcett et al., 2011; Fawcett et al., 2008b). Subsequently, companies may be unable to replicate the excellent performance outcomes reaped by SC exemplars, in that their IT is not adequately supported by an information-sharing culture (Fawcett and Magnan, 2001). An organization’s technological connectivity has to be coupled with its cultural willingness to enable effective information sharing, thereby outperforming competitors (Hult et al., 2002; Stoica et al., 2004).

2.5.2.4 Transactional Relationship

A transactional relationship is frequently referred to as an arm’s-length or adversarial relationship. It has been the predominant type of relationship between buyers and suppliers (Lambert et al., 1996; Handfield and McCormack, 2005), although closer partnerships are reported to be prevalent in multiple disciplines. In general, this type of relationship is characterized by price-driven, short-term oriented (Humphreys et al., 2001), and minimal information sharing, or poor communication (Sako et al., 1997), with limited or no specific assets investment (Hoyt and Huq, 2000), and lack of trust and commitment (Johnston et al., 2004). More specifically, in these relationships, each manufacturer purchases among many suppliers in order to generate price competition among the suppliers (Lambert et al., 1996; Humphreys et al., 2001). In other words, it is aimed to minimize the purchase cost instead of developing a relationship with suppliers (Jap, 2007). On the other hand, a supplier provides regular products/services
to a wide array of customers with very limited relational consideration (Lambert et al., 1996). The relationship terminates when the exchanges end. In general, in a transactional exchange, substantial effort is exerted in creating revenue and volume while minimal attention is paid to long-term interaction or a close relationship.

2.5.2.5 Insufficient Government Effort and Innovation

Government effort and innovation to promote a high level of SCC between manufacturing firms is believed to be insufficient in China. For example, in order to rectify disorder in the currently chaotic logistics industry in China, there has been a call for a greater effort by the Chinese government. It is considered that incentives and innovative policies have to be formulated by the Chinese government so as to remove institutional obstacles such as vicious market competition, inconsistency in the legal system, lack of intellectual property protection, and multiple jurisdictions (Zhang, 2006). A favourable institutional effort has to be made to nurture healthy competition, to encourage continuous improvement, standardize logistics operational practices across the nation, and facilitate collaboration in the industry, to achieve global optimisation. Peng and Vellenga (1993) propose that the Chinese government needs to enhance its role in the improvement of logistics services, ranging from management structural reform, privatization and foreign investment, and transportation infrastructure, to education and research. Fu et al. (2011) report that the future logistics improvement initiatives of the Chinese government are necessary to focus on tax preference, land policy support, road traffic improvement, business environment improvement, resource integration, technology innovation and application, government investment, and bank credit support. Clearly, substantial effort by the Chinese government in SCC has to be leveraged to promote collaboration of the manufacturing industry in China.

In the meantime, the management system innovation of the Chinese government is also critical. Unlike in Western countries, the Chinese government, especially local government, generally exerts influential control over business activities and is deeply involved in the decision-making processes of companies (Luk et al., 2008). The Chinese government can be a form of social capital of business, while they act as planners and supporters of local businesses through providing business-friendly policies, offering financial support and facilitating coordination between corporations. However, the governmental interventions in operations can also cause institutional
uncertainty, through policy ambiguity, extra financial burdens through maintaining close relationships, and political hazards to businesses (Zhang, 2006). Therefore, institutional innovation of the Chinese government, through building up a limited government and providing a stable, legal and standardized institutional environment for SCC among the Chinese manufacturing industry, is crucial.

2.5.2.6 Guanxi

Guanxi refers to a Chinese term used to describe interpersonal relationships or connections, which often involve a continuous mutual exchange of favours (Luo, 2007; Park and Luo, 2001). Guanxi is recognized as complementary and parallel mechanisms for directing economic interactions in the Chinese context. It is believed to play a decisive role in business success or failure in Chinese society. It could facilitate or hinder the implementation of SCC, as it is closely associated with business activities and decisions. Persons and companies in a guanxi network can acquire inside information about changing regulations, rules and incentives from government officials, and the latest movements of new product attributes, advanced technologies, up-to-the-minute market trends and activities of competitors, through managers of other companies (Luk et al., 2008). It is an unwritten rule that companies operating in China have to allocate resources to build up a collaborative guanxi network with government and other business partners, although it generates extra cost (Schramm and Taube, 2003). As a result, the company can benefit from preferential treatment, insider information, reduced intervention, and lower transaction costs. Chinese firms usually only share information with someone they have a close relationship with (Wank, 2005). They tend to choose suppliers and collaboration partners by evaluating closeness of guanxi between them. Guanxi is the prerequisite for entering into any form of collaborative activity with other businesses in China, therefore affecting the formation of SCC among manufacturing firms. Li and Lin (2006) contend that, as a prioritized coordination mechanism, guanxi could disturb formal manufacturing planning, information sharing and flexibility. Therefore, guanxi could be a major barrier to extensive SCC among CMFs.
2.7 Chapter Summary

This chapter discussed four underpinning theoretical paradigms, namely AT, SET, ERBV and Institutional Theory, which, when leveraged together, could better account for the phenomenon of SCC in China. Then, a literature review of three notions, SCM, SCI and SCC, was conducted to highlight the close relationships among them. Furthermore, existing literature on SCC of CMFs was reviewed to reflect the current state of SCC in China and to identify the SCC elements and barriers as revealed by previous studies. After that, a tentative conceptual framework of SCC linking all the elements and barriers was proposed. Finally, five key elements of and six barriers to SCC were discussed in detail. The next chapter will discuss the methodology employed by the present research.
CHAPTER 3 METHODOLOGY

The primary purpose of this inductive case study is to explore how effectively SCC is being implemented by the Chinese E & E manufacturers. Multiple-case study methodology is employed in this research to reveal the complex phenomenon of collaboration between the manufacturers and their SC partners under investigation. The research design of this study, including case selection, data collection, data analysis and quality, complies with procedures suggested by Yin (2009).

3.1 Multiple-Case Study Method

The case study method is a research approach putting emphasis on understanding a dynamic event within single settings (Eisenhardt, 1989b). It is commonly regarded as an appropriate research technique when “how” or “why” questions are asked, and to examine contemporary events in a descriptive mode (Yin, 2009). It is especially useful for the elucidation of the assumed causal relations in real-life settings that are too intricate for survey or experimental strategies. It can also be used to enlighten those circumstances in which the phenomenon being investigated has no clear, single set of outcome. The case study method makes it possible for investigators to maintain the holistic and meaningful distinctiveness of real-life events. Easton (2010) also advocates that case studies offer the key opportunity to disentangle the complexity of a phenomenon and comprehend it in depth and comprehensively. The superiority of case research is in the establishment of convergence on one meaning through using multiple sources of evidence and triangulation processes (Johnston et al., 1999). Case study research can be used for description and theory building through providing evidence for hypothesis generation and for exploration of fields where existing knowledge is insufficient (Cavaye, 1996).

Case study method is appropriate for this research in that the SCC practice of Chinese E & E manufacturing firms is a contemporary initiative of practitioners in the field, the relations between key elements of SCC practices and various barriers are reticular, and the relevant behaviour cannot be manipulated. While the successful experiences of implementing SCC by leading corporations can offer valuable enlightenment on
enhancement of the competitive edge of the whole manufacturing industry in China, the existing systematic evaluation of the key elements of the contemporary SCC practices of Chinese E & E manufacturers is lacking.

Multiple-case study method is employed in this study to leverage the replication logic (Eisenhardt, 1989b). The findings or evidence from multiple cases are often regarded as more compelling, so that the robustness of the study can be enhanced. Multiple-case study method has been widely employed by many academic researchers to investigate SCC activities (Frankel et al., 2002; Fawcett et al., 2008a; Whipple and Russell, 2007; Holweg and Pil, 2008; Ramanathan et al., 2011).

3.2 Case Selection

Case selection is a vital step in building theory from case studies (Voss et al., 2002). According to Eisenhardt and Graebner (2007), the theoretical sampling approach is appropriate for case research. The major rationale for selection of cases is proper illumination and extension of relationships and logic among constructs. Each sample should complement the others by literal and theoretical replication of the results under various conditions, or by addressing different facets of the overall theory (Yin, 2009; Stuart et al., 2002). The aim of selecting the cases is not representativeness, but exemplification (Stuart et al., 2002).

In order to investigate the key elements of SCC and identify the major obstacles, four cases from leading CMFs in E & E industry were selected. These firms are publicly recognized as the leaders of the industry for their famous brand reputation, market share, and annual sales. These four cases consist of two focal manufacturing firms and two Tier 1 suppliers, to facilitate an in-depth understanding of collaborative behaviour from both manufacturer and supplier perspectives. Those manufacturing firms collaborate with a variety of customers including top domestic retailers, franchisees and focal manufacturers, world-class international retailers, and Fortune 500 manufacturing firms worldwide. The use of four cases falls into the recommended range of four to ten cases suggested by Eisenhardt (1989b) in using the case study methodology.

While the four cases of this research serve as exemplars of leading manufacturing firms
in E & E industry in the Pearl River Delta area, the results of this study can be generalized to the SC sector within this domain. Table 3.1 gives an overview of the firms that were included in this study.

### Table 3.1 Company Profiles

<table>
<thead>
<tr>
<th>Company</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
<th>Company D</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Annual sales (USD)</td>
<td>&gt;0.16 Billion</td>
<td>0.4 Billion</td>
<td>0.96 Billion</td>
<td>&gt;0.24 Billion</td>
</tr>
<tr>
<td>3. Main product</td>
<td>Micro motor</td>
<td>Household appliance</td>
<td>Gas appliance</td>
<td>Printed Circuit Board (PCB)</td>
</tr>
<tr>
<td>4. Number of employees</td>
<td>&gt;6000</td>
<td>&gt;3000</td>
<td>&gt;3000</td>
<td>&gt;3000</td>
</tr>
<tr>
<td>5. Major markets</td>
<td>Global</td>
<td>Domestic</td>
<td>International</td>
<td>Domestic</td>
</tr>
</tbody>
</table>

### 3.3 Data Collection

The research protocol (see Appendix A) was designed and guided by extant theoretical underpinnings, including AT (e.g., Eisenhardt, 1989a), SET (e.g., Griffith et al., 2006), ERBV (e.g. Eisenhardt and Schoonhoven, 1996), and Institutional Theory (e.g., North, 1997). It was developed to guide the data collection process, therefore increasing the reliability of the case study research. A set of substantive questions were included in the protocol to reflect the actual line of inquiry and to serve as prompts in asking questions during the case study interviews. The protocol consisted of four main sections: (a) Introduction to the case study; (b) Data collection procedures; (c) Case study questions; and (d) Company information.

Multiple sources of evidence were used for this research. They include semi-structured, in-depth interviews, documentation, and archival records. Using multiple sources of evidence provides the most imperative advantage for case study research. It involves the development of converging lines of inquiry, in a process of triangulation and corroboration (Yin, 2009). Consequently, case study findings or conclusions generated from several, different sources of evidence are believed to be more convincing and accurate.

The semi-structured, in-depth interview is designed to focus on SCC of Chinese
manufacturers, but at the same time to remain flexible so that rich data and additional insights could be accessed (Crowther and Lancaster, 2009). Semi-structured, in-depth interview is a method of data collection in which the interviewer asks about a set of topics by listing some predetermined questions, but the order of topics and questions may vary. Moreover, the interviewer may determine to skip some topics and questions and ask additional questions as appropriate (Saunders and Lewis, 2012). In some circumstances, the interviewees may be asked to give their own opinions on certain phenomena, and such propositions can be used as roots for further exploration (Yin, 2009). Therefore, extension of an interview may be needed, instead of just a single session.

When interviews were conducted at the four selected manufacturing firms, the design of the semi-structured in-depth interviews allowed changes in the order of questions according to the context of conversation and the availability of different managers. Some questions were skipped as they were not applicable for some manufacturing firms or suppliers. Some new questions were raised based on the responses of managers to some queries, so as to seek more detailed explanation and clarification of their collaboration activities.

To identify the major obstacles causing logistics inefficiency and hindering SCC of the CMFs, a set of predetermined questions were asked during the in-depth interviews. Interview participants were chosen because of their direct involvement in SCC practices. In total, 20 departmental and senior SC managers of the four manufacturing companies, such as Chief Executive Officer (CEO), Vice President (VP), purchasing manager, supplier relationship manager, and warehouse manager, were interviewed. These managers were also encouraged to give their own opinions so that all the important factors affecting SCC were discussed. In addition, they were encouraged to introduce other managers who engage in SCC activities to participate in the project, to provide complementary views.

The entire interview conversations were conducted in Mandarin, and recorded with the permission of the interviewees so that an accurate rendition of all interviews could be provided (Yin, 2009). Each interview lasted no more than two hours. Handwritten field notes were taken. If any questions were later found to have been not answered clearly or properly during the interviews, follow-up interviews through telephone calls and
emails were carried out for clarification and further discussion. To improve internal consistency, site visits were conducted after all interviews were completed to get in-depth understanding of the business operations. All audio-taped interview conversations were transcribed and translated into written documents. Organized field notes of all interviews were sent to the interviewees via e-mail to assess the validity of the description and interpretation. A summary of managers interviewed and length of each interview is outlined in Table 3.2. The VP of Company A was the only person interviewed since she worked in different departments for a long time. As one of the leaders of the company, her opinions can be representative to managers in other departments.

**Table 3.2 Interview Records**

<table>
<thead>
<tr>
<th>Company Studied</th>
<th>Position of Interviewee / Department of the Manager Interviewed</th>
<th>Duration of Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1. VP of Operation</td>
<td>1h24min</td>
</tr>
<tr>
<td></td>
<td>2. IT</td>
<td>27min</td>
</tr>
<tr>
<td></td>
<td>3. Customer Service</td>
<td>50min</td>
</tr>
<tr>
<td></td>
<td>4. Warehouse</td>
<td>1h16min</td>
</tr>
<tr>
<td></td>
<td>5. Purchasing</td>
<td>1h5min</td>
</tr>
<tr>
<td></td>
<td>6. Production</td>
<td>38min</td>
</tr>
<tr>
<td></td>
<td>7. Lean Production</td>
<td>1h3min</td>
</tr>
<tr>
<td></td>
<td>8. Sales</td>
<td>1h11min</td>
</tr>
<tr>
<td>B</td>
<td>1. Purchasing A</td>
<td>1h16min</td>
</tr>
<tr>
<td></td>
<td>2. VP</td>
<td>1h45min</td>
</tr>
<tr>
<td></td>
<td>3. Purchasing B</td>
<td>2h18min</td>
</tr>
<tr>
<td></td>
<td>4. Sales</td>
<td>18min</td>
</tr>
<tr>
<td></td>
<td>5. IT</td>
<td>20min</td>
</tr>
<tr>
<td>C</td>
<td>1. Warehouse</td>
<td>20min</td>
</tr>
<tr>
<td></td>
<td>2. IT</td>
<td>12min</td>
</tr>
<tr>
<td></td>
<td>3. CEO</td>
<td>1h12min</td>
</tr>
<tr>
<td></td>
<td>4. Production</td>
<td>13min</td>
</tr>
<tr>
<td></td>
<td>5. Purchasing</td>
<td>1h14min</td>
</tr>
<tr>
<td></td>
<td>6. Sales</td>
<td>24min</td>
</tr>
</tbody>
</table>

A pilot case study was launched to refine the data collection plan with respect to both the content of the data and the procedures to be followed (Yin, 2009). It helped improve the design of the interview questions and ensure that the questions asked were exactly relevant to the information being sought. It also helped improve the wording of the interview questions to avoid any misunderstanding that might lead to a wrong conclusion. The participant in the pilot case study was also asked to comment on the interview questions in terms of readability, to minimize ambiguity. For example, some
questions in the main study would be asked in slightly different ways when addressed to different interviewees, such as manufacturer and supplier, so that they could be more meaningful to the respondents. Some questions in the main study would be put forward in a way that was more appropriate for different products, operations and organizational structures.

The pilot case study involved one industry participant. Upon completion, the company participating in the pilot case study was excluded from the multiple case studies to avoid possible bias. The main case study commenced after the interview questions had been duly refined to serve the purpose of the study.

3.4 Data Analysis

Data analysis was conducted simultaneously and incrementally with the data collection of this research (Barratt et al., 2011; Eisenhardt, 1989b). In this manner, the researchers were able to capture the real SCC activities of the manufacturing firms from the data gathered. Constructs of the proposed collaboration framework and the relationships between elements of SCC and major barriers were adjusted based on the data analysis outcomes.

3.4.1 Content Analysis

Content analysis was used to analyse the data collected through semi-structured interviews. Content analysis is widely employed to analyse qualitative data (Guthrie et al., 2004; Spens and Kovács, 2006). It is a tool for the objective, systematic, quantitative and reliable study of publications (Ellinger et al., 2003). It attempts to quantify qualitative data by noting frequencies of occurrence of keywords, events, actions and so forth (Crowther and Lancaster, 2009). Upon completion of each interview, the voice recordings were transcribed into a text format and then translated from Mandarin to English, resulting in 147 pages of textual material. The data was then imported into the qualitative data analysis tool “QSR NVivo 8.0”. Free nodes and tree nodes were developed cumulatively to classify responses from individual SC managers into a classification of themes or patterns, to subsequently facilitate within-case analysis and cross-case comparison for this study. Key codes and phrase frequencies of
collected data were indicated as methods for determining the relative importance of elements of and barriers to SCC.

3.4.2 Within-case Analysis and Cross-case Comparison

Within-case analysis and cross-case comparison were conducted to examine the state-of-art of SCC practices collected from the interviewed manufacturers. The investigation was to determine whether there were similarities and differences in collaboration between manufacturers and SC partners in the findings. Within-case analysis was used to study the interviewed companies individually, focusing on their views on the key elements of and major obstacles to SCC. Cross-case comparison looked across all firms under study to identify common themes about the SCC of different manufacturing firms and SC partners. Through the within-case analysis and the cross-case comparison, the feasibility of enhancing industry-wide SCC in the manufacturing industry of China, through cross-organizational collaboration and institutional effort, could be explored in detail.

3.5 Validity and Reliability

According to Yin (2009), four tests are usually used to ascertain the quality of any empirical social research, including case studies. They are construct validity, internal validity, external validity and reliability. These tests were applied throughout the whole process of each case study of this research. Yin (2009) also identified more detailed case study tactics for operating these tests (Table 3.2).

3.5.1 Construct validity

Construct validity referes to the identification of accurate operational variables for the phenomenon to be investigated (Yin, 2009). It also refers to the extent to which a research procedure satisfies the criteria of a critical observation of reality (Gibbert & Ruigrok, 2010). To ensure construct validity, convergence of multiple sources of evidence for each of the important elements of and obstacles to SCC in the proposed framework was sought. This evidence was gathered through semi-structured interviews, field notes, company documents review, and site observations. All data were documented and tracked to maintain a verifiable chain of evidence. To ensure the
Validity of the constructs, the draft case study reports upon the investigation of each manufacturing firm were reviewed by key informants.

### Table 3.2 Implementation of Case Study Tactic

<table>
<thead>
<tr>
<th>Tests</th>
<th>Case Study Tactic</th>
<th>Implementation in This Research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construct validity</strong></td>
<td>- Use multiple sources of evidence</td>
<td>- Triangulation of different sources of data such as multiple in-depth interviews, field notes, company documents and site observations.</td>
</tr>
<tr>
<td></td>
<td>- Establish chain of evidence</td>
<td>- All data were documented and tracked to maintain a verifiable chain of evidence.</td>
</tr>
<tr>
<td></td>
<td>- Let key informants review draft case study report</td>
<td>- Draft case study reports upon the investigation of each manufacturer were reviewed by key informants.</td>
</tr>
<tr>
<td><strong>Internal validity</strong></td>
<td>- Do pattern matching</td>
<td>- Explored meaningful patterns of SCC between manufacturers and suppliers in terms of SC OA, IS, SC partnering, process integration and collaborative synchronization.</td>
</tr>
<tr>
<td></td>
<td>- Do explanation building</td>
<td>- Similarities and differences were closely examined with extant literature.</td>
</tr>
<tr>
<td></td>
<td>- Address rival explanations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Use logic models</td>
<td></td>
</tr>
<tr>
<td><strong>External Validity</strong></td>
<td>- Use theory in single-case study</td>
<td>- Selected four manufacturing firms collaborating with different SC partners in domestic and international markets.</td>
</tr>
<tr>
<td></td>
<td>- Use replication logic in multiple-case studies</td>
<td>- Used interview protocol with the same template for all interviewed firms.</td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
<td>- Use case study protocol</td>
<td>- Selected four manufacturing firms collaborating with different SC partners in domestic and international markets.</td>
</tr>
<tr>
<td></td>
<td>- Develop case study database</td>
<td>- Used interview protocol with consistant format for all participants.</td>
</tr>
</tbody>
</table>

Source: Yin (2009, p. 43)

### 3.5.2 Internal validity

Internal validity refers to the establishment of causal situations between variables and results (Yin, 2009; Farquhar, 2012). The purpose of internal validity is to convince the reader that the research outcome is generated through rigorous examination of data (Farquhar, 2012). Pattern matching is one of the most desirable tactics suggested by literature to address internal validity (Yin, 2009; Saunders et al., 2009). Pattern matching generally requires the development of a proposed conceptual framework, employs existing theory, and then tests the validity of the framework as an approach to
explaining empirical outcomes (Saunders et al., 2009). In other words, researchers usually compare an empirically observed pattern with a predicted one. If the patterns coincide, internal validity can be confirmed. Eisenhardt (1989b) also claims that researchers can argue for internal validity by close examination of emerging concepts and theory with existing literature.

This study explored patterns of SCC between manufacturers and SC partners by proposing a preliminary framework of SCC based on the work of Simatupang and Sridharan (2005a). The empirically based pattern was subsequently compared with the preliminary one to strengthen internal validity. Similarities and differences of collaboration between different SC partners were identified and validated with evidences from extant literature.

3.5.3 External validity

External validity, also refers to generalizability, which deals with the belief that theories must be proven to readers for phenomena not only in the environment in which they are investigated but also in other environments (Gibbert & Ruigrok, 2010). Case study research is frequently criticized for lack of generalizability since observation is not based on population. Therefore, its contribution is often not accepted. However, Yin (2009) argues that, as multiple experiments, the mode of generalization of multiple case studies is analytic generalization rather than statistical generalization. Hence, the aim of case studies is not to generalize the findings statistically to a population (Cavaye, 1996). The key elements of and major barriers to SCC are validated by the subjects of the research who are operating in an SC and logistics context. In an effort to support external validity of this research, appropriate forms of interview protocol with the same template were used for all firms under investigation. Multiple cases and relevant literature were used as data sources for replication of findings.

3.5.4 Reliability

Reliability refers to the demonstration that the same outcome can be reached if the procedure of a case study is repeated (Yin, 2009; Farquhar, 2012). Transparency and replication are key issues related to reliability (Gibbert & Ruigrok, 2010). To enhance reliability, a case study protocol was designed as a direction for the investigator to
collect data from each manufacturing firm. It specifies clearly scheduled data collection tasks and detailed procedures, as well as a set of essential questions reflecting the actual line of inquiry. Case study notes as a result of interviews and analysis of documents were stored in a manner that other persons can retrieve them efficiently later. A formal, presentable database was created to enable other investigators to assess the evidence directly and not be constrained to the written case study reports. A chain of evidence was maintained to facilitate the trace of any evidence from initial research questions to ultimate case study conclusions, for readers of the case studies. Triangulation was adopted to ensure research reliability, in obtaining the same piece of information from different sources (McCutcheon and Meredith, 1993). For example, same questions regarding particular issues were asked a few times to different managers of the same company so that the information could be verified, to ensure research reliability.

3.6 Chapter Summary

This chapter has justified the research methodology employed for the present study. A detailed explanation of the multiple-case study approach has been provided. The design of semi-structured interview questions, the selection of cases, and the data collection process have been described. The procedure of data analysis has also been depicted. The next chapter will present the empirical findings collected from the interviews.
CHAPTER 4 Within-Case Analysis

This chapter reports the findings of the analysis within the four cases investigated in this study. To ensure consistency, a template was used for all cases in the analysis looking at the company profile, objective alignment, information sharing, SC partnering, process integration, collaborative synchronization and barriers to SCC.

4.1 Case A

4.1.1 Overview

Company A is one of the leading manufacturers specializing in development and production of small and special electrical motors in China. Its products are exported globally to world-class E & E manufacturing corporations. This company is a Tier 1 supplier that collaborates with both downstream international as well as domestic customers and upstream Tier 2 suppliers. The position of Company A in the SC is shown in Figure 4.1.

Figure 4.1 The Supply Chain Position of Company A

4.1.2 Supply Chain Objective Alignment

Common objectives were only set up with strategic international customers and suppliers (see Table 4.1), but not with domestic customers or other non-strategic SC partners. Common objectives were unachievable where some suppliers were speculative, signing the agreement for the purpose of maintaining business share rather than sincerely committing to the initiative. These suppliers were concerned that if they refused to sign the collaborative agreement they might lose their existing business to competitors who accepted the offer. Later on, however, these suppliers
breached the bilateral agreement readily to seek more benefits. Therefore, the aligned SC objectives could not be attained due to the opportunistic behaviour of these suppliers.

4.1.2.1 Executive Sponsorship

The CEO of Company A was open-minded and involved proactively in various SCC initiatives (see Table 4.1). He had very strong motivation to learn the best SCM practices from those world-first-class customers. In an effort to improve on-time delivery, the CEO set concrete performance targets for hourly delivery of raw materials to assembly lines. He also encouraged employees to make continuous improvement by providing funds to award those who made creative enhancements. In particular, in order to develop collaborative relationships with a supplier and guarantee the quality and continuity of supply, he made specific asset investments on facilities, and authorized astrategic suppliers to be responsible for the management of those facilities. As a result, a collaborative relationship with high level of mutual trust was cultivated with that supplier. With regard to the trade-off in making or buying, he believed that it would be wise to focus on core capabilities and outsource component parts from suppliers. As the Vice President of the company stated:

“The CEO of our company decided to make asset specific investment on facilities and tools but let suppliers be in charge of the management of those facilities to reap benefits. This is very uncommon in China. He believed that, instead of trying to produce everything, it would be better to let those suppliers concentrate on what they are specialized in.” D-1-1

Overall, the proactive engagement of the CEO positively propelled the implementation of SCC initiatives in Company A.

4.1.2.2 Incentive Alignment

Incentives were partly aligned between company A and its strategic SC partners (see Table 4.3). International customers rewarded Company A frequently for their superior performance while domestic customers usually did not share costs and risks with
Company A, even though they were asked to do so for better collaborative decision making.

On the supply side, incentive alignment agreements were signed with strategic suppliers for strategic or bottleneck items. Company A promised to reward suppliers with increased business share, while they were obliged to return some profit back to Company A if the purchasing quantity exceeded the promised amount. Sometimes, if part of inventory was not used because of order cancellation by customers, Company A negotiated with suppliers to share the costs. Basically, costs and benefits were distributed between Company A and its strategic SC partners as agreed.

By comparison, it was very hard to ask non-strategic SC partners to share costs and risks. During peak seasons, inventory shortages might occur not only at Company A but also at the supplier side. In order to satisfy the changing demand, Company A attempted to maintain some inventory of critical components. It informed its customers that an extra buffer inventory was kept in its warehouses and asked if they could share part of the losses if excessive inventory was accumulated as a result of the significant change in demand. However, the majority of customers were unwilling to share the burden. Subsequently, Company A had to make its own evaluation to cope with the variation in demand. Meanwhile, Company A needed to ask its suppliers to prepare some inventory as well. Otherwise, the peak demand could not be satisfied if suppliers failed to maintain enough inventory of ‘items’ with a long lead time. Subsequently, Company A had to make promises to help suppliers to digest the excess inventory if the demand was lower than the forecast. Overall, the Vice President believed:

> "Although incentive alignment contracts were signed, nobody really wanted to share costs and risks but tried to push them to upstream suppliers. This was not only true for domestic customers but also international customers. Unfortunately, this kind of situation would last for very long time." D-1-9

Therefore, further improvement on incentive alignment between Company A and its SC partners is necessary.

---

1. D – The sequence of the companies interviewed, 1- The number of interviews, 1- Page number of the transcript
4.1.3 Information Sharing

A wide array of information was shared between Company A and its SC partners (see Table 4.2). Tactical information, such as planning and forecasting, and operational information, such as order and delivery, were shared through IOSs with customers and suppliers. Face-to-face communication was regularly organized to further facilitate information sharing with SC partners. Personnel were assigned to stay on customers’ sites to improve accuracy and timeliness of information sharing. For instance, customer service staff were allocated at both international and domestic customers’ sites to ensure high quality information sharing. They were required to record time of goods delivered to customers’ plants and report any quality problems of products their customers encountered, on a daily basis. These operations suggest that information sharing between Company A and its SC partners was extensive.

4.1.3.1 Information Connectivity

A number of IOSs were established by Company A to support the frequent information sharing and extensive SCC with its SC partners (see Table 4.2). All important information could be shared internally and externally through those IOSs included SAP, SRM, CRM and others. The SAP system was the core operation platform for the execution of planning, order fulfilment, cost calculation, and finance activities of the company. SRM and Secure Network Communication (SNC) were specialized for JIT initiatives. It can be seen that information connectivity between Company A and its SC partners has been built to facilitate information exchange.

However, some small suppliers resisted using the online platform for information exchange and instead preferred to use fax, due to a lack of IT knowledge. Many were
family-run factories, which might not have adequate computer knowledge to utilize advanced IT. By adhering to old technology, no extra investment and cost was involved. To improve the situation, Company A organized training sessions on several occasions to make sure those suppliers understood the importance of IOS and acquired the necessary computer skills.

4.1.3.2 Information Quality

International customers shared high quality information frequently with Company A (see Table 4.2). By working closely with retail channels, international customers, especially those in North America, were able to provide very accurate weekly rolling plans, for Company A to make its own plans. By contrast, domestic leading customers usually shared very inaccurate information less frequently. As the Vice President of Company A put it:

“The information provided by our North American customers is usually accurate and clear. The planning and forecast information is very useful for us to produce our own production plans and forecasts. However, the information provided by domestic customers is generally inaccurate and cannot be used for the arrangement of actual production. This is because domestic customers have no real intention to collaborate but employ SCC initiatives to push suppliers to make early production. They intend to reap more benefits for themselves by disadvantaging suppliers under the banner of collaboration.” D-1-1

As a result of huge pressure exerted by suppliers like Company A and a gradual increase in SCM knowledge, some domestic customers realized the importance of collaboration with suppliers and started to improve their performance. The risks of having excessive inventory at Company A had as a result been lowered significantly.

4.1.3.3 Willingness to Share

Company A and international customers shared useful information willingly with each other (see Table 4.2). Generally, international customers were more willing to share information because they had a clear understanding about the importance of information sharing with their suppliers. By contrast, domestic customers were unwilling to share information with Company A. They tended to manipulate important information
so as to take advantage of suppliers opportunistically for own interests. As such, domestic customers needed to improve their willingness to share more accurate information with their suppliers.

Table 4.2 Summary of Information Sharing Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Domestic Customer</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Sharing</td>
<td>Tactical information sharing and assignment of staff on customers’ sites.</td>
<td>Same arrangement as that for international customers.</td>
<td>Tactical information sharing with suppliers.</td>
</tr>
<tr>
<td>Information Connectivity</td>
<td>Multiple information systems were rolled out to establish information connectivity.</td>
<td>Same arrangement as that for international customers.</td>
<td>Electronic connection was built</td>
</tr>
<tr>
<td>Information Quality</td>
<td>Accurate and detailed information was shared frequently.</td>
<td>Inaccurate information was shared due to lack of real intention to collaborate.</td>
<td>Accurate information was shared with suppliers on weekly basis.</td>
</tr>
<tr>
<td>Willingness to Share</td>
<td>High willingness to share information.</td>
<td>Sharing inaccurate information for prompting early production.</td>
<td>Updating information for VMI operation on daily basis.</td>
</tr>
</tbody>
</table>

4.1.4 SC Partnering

Company A formed long-term partnering relationships with its major customers (see Table 4.3). Company A promised to make continuous cost reduction while its customers would reward its excellent performance in return with increased share of business orders. For example, one of its leading international customers continuously increased the proportion of purchasing from Company A owing to its reliable quality and reasonable price. Subsequently, Company A became the sole source of supply of micro-motors for that customer. Some of customers’ staff were assigned to provide on-site assistance permanently. Evidently, the collaboration between Company A and this customer was very successful. On the other hand, the collaboration with domestic customers remained adversarial in that those customers had no real intention to collaborate.

Different collaborative policies were adopted by Company A to manage different categories of suppliers. Long-term agreements were usually signed with strategic suppliers, therefore guaranteeing for them a certain quota of business share. Extensive communication with those suppliers was maintained by the top management of Company A. Relatively less effort was spent on critical suppliers who usually possessed a large amount of production capacity and financial capital. In an aim to strengthen the
collaborative relationship with strategic and bottleneck suppliers, favoured conditions were usually offered to them.

### 4.1.4.1 Supplier Development

Supplier development initiatives were employed by international customers and Company A to make continuous improvement in their suppliers’ performance (see Table 4.3). For instance, international customers frequently sent experts to Company A to promote lean manufacturing practice through special supervision or delivery of lectures. Customer’s feedback on the quality of products also helped Company A make continuous enhancement. On the other hand, instead of assisting their suppliers, domestic customers preferred to internalize production rather than develop Company A’s capability. They built their own motor plants and only purchased from Company A during peak seasons to meet surging demand.

To improve the performance of its suppliers, Company A assisted them in terms of technology, financial, quality, and problem-solving capabilities. Usually, engineers were sent to suppliers’ plants to supervise them for quality improvement. If quality issues occurred and suppliers sought help, Company A would offer supervision whenever it was necessary. Some of the suppliers were very cooperative and responded immediately to make improvement according to those suggestions put forward by Company A.

Company A offered assistance to those suppliers who were critical but had insufficient capital. Even though the existing business between the two parties was not sizeable, as long as the suppliers had a strong intention to build up a long-term relationship with Company A and there was a high possibility that the business could grow significantly in the near future, Company A would consider offering financial support to them. A good example was given by the Vice President:

> “Some suppliers were very strong in technology and had loyalty to collaborate with us but were lacking funds. We purchased the facilities and moulds they needed, then leased the equipment to them to manage the assets. These were the most successful examples of close collaboration with our suppliers. However, our effort on supplier development is still insufficient.” D-1-7
4.1.4.2 Low Mutual Trust

There was high level of trust between strategic international customers and Company A (see Table 4.3). This was mirrored through the fact that 100 per cent of orders from a strategic international customer was placed with Company A. The customer even treated Company A as one of its own departments. More importantly, international customers took responsibility for the idle raw materials procured by Company A due to their forecasting errors, and therefore could be trusted. In contrast, domestic customers never took responsibility for those costs and risks caused by their poor forecasting of their actual demand, and hence could not be trusted.

A high level of mutual trust was established between Company A and a small number of strategic suppliers, who trusted Company A for a few reasons. Firstly, if Company A asked suppliers to prepare some stock of raw materials that became excess inventory later as a result of demand variation, the company would pay for those inventories. Secondly, if suppliers encountered difficulties, Company A would offer assistance. Lastly, Company A did not take advantages of its suppliers by borrowing Western SCC initiatives. High level of trust was progressively developed between Company A and key suppliers through proper adoption of collaborative practices.

On the other hand, trust between Company A and most of the non-strategic suppliers was very low. If suppliers were required to provide a breakdown or cost analysis of their products, they always held back the full information. It was impossible to know how much profit they actually earned. Owing to the fact that those suppliers could not be trusted, it was impossible for Company A to rationalize its supply base and rely on a sole source of supply, in the way international customers usually managed their supply bases. If Company A only had a sole supplier for a component, there was reasonable chance that the supplier might threaten Company A for more benefit. The VP explained:

“We all understand the importance of SCC. Therefore, strategic partners are identified for collaborative effort. However, the collaborative relationship lacks the most important ingredient – a high level of mutual trust. In China, partnership is mainly superficial and not much better than a pure transactional relationship.” D-1-8
The level of commitment of some of the suppliers was especially low as well. Normally, if a long-term agreement was signed with a supplier, preferential policies such as large order quantity but not the highest profit was assured. If the supplier was totally price oriented, it would strongly feel that the guaranteed margin was too low and therefore seek ways to seek more business from other customers for better profit return. As a result, the long-term collaborative relationship would be ruined. Some suppliers simply refused to believe that preference policies would actually be offered to them. Some suppliers would appreciate Company A when they received assistance but behaved very differently after the difficulties were overcome. Generally, the level of commitment of suppliers was very low.

Table 4.3 Summary of SC Partnering Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Domestic Customer</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC Partnering</td>
<td>Partner relationships with a few leading international customers.</td>
<td>Adversarial collaboration</td>
<td>Partner relationships with a few strategic suppliers.</td>
</tr>
<tr>
<td>Supplier Development</td>
<td>Extensive supplier development practices were employed by leading customers.</td>
<td>Prefer internalization and only purchase during peak season.</td>
<td>Wide range of supplier development practices was adopted.</td>
</tr>
<tr>
<td>Mutual Trust</td>
<td>High level of trust between a few leading customers and Company A.</td>
<td>Superficial partnership with low level of trust.</td>
<td>High level of trust was nurtured with a few key suppliers.</td>
</tr>
</tbody>
</table>

4.1.5 Process Integration

The findings reveal that both internal and external SC processes of Company A would need to be integrated (see Table 4.4). The overall inventory level was high, and last-minute changes occurred frequently. Coordination between different departments would also need to be streamlined and optimized.

4.1.5.1 Mature Just-In-Time Initiative

JIT approach at Company A was considered very mature already since it was adopted in 1990s (see Table 4.4). Company A provided JIT delivery service to international customers in one or two hours and to domestic customers on a daily basis. In order to facilitate normal JIT delivery, suppliers of Company A were also required to make JIT delivery of component parts on the same day of actual assembly. Basically, the JIT
approach operated smoothly between Company A and its SC partners.

4.1.5.2 Developing Lean Manufacturing

Company A started to implement the lean manufacturing initiative from 2006 on a relatively small scale (see Table 4.4). Currently, the level of lean initiative was believed to be far behind that of the international customers but comparatively better than other domestic peers in China. The lean efforts were exerted in various areas such as layout, logistics, safety inventory, and production flow directions. Many production lines were designed and set up by teams in workshops. Participation by workers was encouraged as well. An organizational culture of making continuous improvement had been cultivated within this company. Everybody was required to engage in lean initiatives and make continuous effort. Specific targets were set by different departments to make creative improvements. A universal steering lean gallery was set to display the achievements of lean manufacturing. As a result, production efficiency had been improved from 50 per cent to 70 per cent after the adoption of the lean approach.

4.1.5.3 Less Than Mature Sales and Operations Planning Process

Being unable to match supply with demand, the S&OP process of Company A was less than mature (see Table 4.4). Owing to the fact that both downstream and upstream SC partners were unwilling to make collaborative decisions to manage demand velocity, supply shortages occurred regularly during peak seasons.

In addition, Company A was not strong in forecasting its demand. Forecasting was mainly based on historical data, qualitative estimation, and customers’ replenishment plan. Normally, Company A generated forecasts based on the aggregated market demand that was offered by various departments including sales, purchasing, and technology, and then combined with historical data.

Sophisticated forecasting tools were unavailable. Currently, spreadsheets were used to compute forecasts. Although all data were available in the information system, they had to be exported to Excel to enable further analysis. After the computation of forecasts, all data had to be imported back into the information system. While some data could be produced automatically, information on raw materials had to be entered into the system manually. After forecasts were calculated and production plans were
generated, Company A would share their production schedules with suppliers through their online platform.

Both international and domestic customers provided their annual forecasts to Company A to work out an annual forecast for arrangement of facilities, purchasing and workers. Rolling forecasting was also provided on a weekly basis by international customers and on a monthly basis by domestic customers.

Planning difficulties were encountered by Company A since ad hoc changes were frequently made to the master plans, which had caused enormous inefficiencies and inaccuracies. For example, while data on the availability of raw materials in information systems indicated that it was ready for production, it would turn out at the last minute that one item was still missing. As a result, the plan for mass production had to be altered. In the meantime, the change of plan and production had to be relayed to other departments such as warehousing and logistics so that subsequent plans and arrangements had to be adjusted accordingly. The low quality of information and poor functional coordination were some of the significant challenges that Company A was facing and had to surmount. Timely and accurate information was the key determinant for improvement. Therefore, the significant gap between planning and execution was one of major challenges for Company A.

4.1.5.4 Widely Adopted Vendor Managed Inventory

VMI was widely adopted by Company A and its SC partners (see Table 4.4). The majority of leading international and domestic customers required Company A to build warehouses close to their plants to facilitate VMI operation. VMI operation between Company A and its suppliers was very different, since goods were required to be delivered to Company A’s warehouse and managed by Company A. However, the inventory still belonged to the suppliers until they were used by Company A. Information about the status of the inventory was updated every day and could be checked by suppliers through Company A’s Web-based information system.

Before the implementation of VMI, Company A spent a large amount of capital for holding inventory. After that, 60 per cent of the inventory was with the suppliers. Only a small amount of capital was needed for maintaining the inventory of electronic raw
materials. Evidently, Company A had saved huge costs through the adoption of the VMI approach.

The VMI approach in China was quite different from that in Western countries. With the implementation of VMI, international customers would hold some safety inventory to ensure that six weeks of normal production could be maintained if the lead time was four weeks. If demand changed, there would be enough time for suppliers to replenish the inventory. Frequent communication with overseas customers was unnecessary as long as safety inventory was available. All Company A needed to do was to replenish inventory whenever it was needed. However, the mode of VMI in China was different. It was an approach employed by domestic manufacturing firms to prompt suppliers to produce in advance rather than have more effective use of safety inventory. If the inventory produced was not used by the deadline, domestic customers were required by Company A to take the responsibility and make payment for that. As the Vice President explained:

“The rule of the game is totally different between Chinese supply chain partners. VMI is an approach adopted by domestic downstream customers to transfer costs and risks to upstream suppliers. They generally require suppliers to prepare raw materials but do not take any responsibility. In this case, we suffer great losses because we are in the middle of the supply chain. If customers cannot assure the accuracy of plans, it would be very hard for us to make promises to suppliers. Otherwise, we may need to take responsibility for both ends. As a result, a vicious circle is created. However, they are making improvement since domestic customers have started to consider suppliers’ requirements.” D-1-1

4.1.5.5 Distribution Process

Distribution network design, modelling and optimization of Company A had not been explored (see Table 4.4). Distribution and management of external warehouses for VMI operation were simply outsourced to 3PLs to reduce cost. In fact, Company A had done some research on building a centralized warehouse of its own for improved inventory management and distribution performance. Some calculations based on quotations offered by 3PLs had been done. However, significant increase in cost was found to be the major problem. It was also considered too complex to work out a solution in a short
period.

Table 4.4 Summary of Process Integration Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Domestic Customer</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process Integration</strong></td>
<td>Internal and external processes needed to be integrated and optimized.</td>
<td>Hourly JIT delivery.</td>
<td>Daily JIT delivery.</td>
</tr>
<tr>
<td>Lean Manufacturing</td>
<td>The level of lean manufacturing was far behind that of the international customers but comparatively better than that of other domestic manufacturing firms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S&amp;OP</td>
<td>Less than mature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMI</td>
<td>Standard VMI operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution Process</td>
<td>Distribution network design, modeling and optimization remain blank.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.1.6 Collaborative Synchronization

Collaborative synchronization was not observed between Company A and its SC partners.

4.1.6.1 SC Visibility

The SC visibility of Company A was very low (see Table 4.5). Basic tracing and tracking of orders and processes was not accomplished, which had caused significant SC inefficiencies. Many last minute changes had to be made due to low visibility of the flow of materials. Improvement of SC visibility was critical for Company A to diminish the gap between planning and execution.

4.1.6.2 No Synergistic Planning and Forecasting

Synergistic planning and forecasting between Company A and its SC partners was not observed (see Table 4.5). Although rolling forecast and planning information was shared by major customers, Company A would not make arrangements for actual production unless purchasing orders were received from customers. If Company A had to commence production before an order was actually received, an agreement would be signed with customers to make sure that costs and risks would be shared if uncertainties occurred.
At this stage, Company A tried to create a single demand forecast with inputs from multiple roles within the company. However, other higher level demand planning capabilities, such as demand segmentation, incorporation of promotion and other demand-shaping activities were not observed. More advanced demand planning capabilities, such as ability to respond to unplanned events in a timely manner, scenario planning, and demand sensing, were basically non-existent.

4.1.6.3 No Inventory Optimization

The current inventory level of Company A was high (see Table 4.5). Although the CEO took the lead to reduce inventory of finished product, inventory in external warehouses remained high. Strict rules were set for ahead-of-schedule production, and only a limited number of days were allowed for finished products to be moved to warehouses. However, inventory was accumulated at multiple points due to demand variations and inaccurate forecasts and planning information. The adoption of inventory optimization was crucial for Company A to lower inventory.

4.1.6.4 Collaborative Innovation

The importance of collaborative innovation had been recognized by Company A and its SC partners (see Table 4.5). If there was a plan to launch a new product, the technology department of Company A would take responsibility to communicate with customers first, since information provided by the customer for new product design was crucial to success. Suppliers were also consulted when it came to the selection of component parts, as this was critical for cost reduction. Overall, both customers and suppliers were involved into the new product design process.

4.1.7 Barriers to SCC

The most significant barrier to SCC initiatives of Company A was that no one really wanted to share risks and costs, but attempted to transfer risks to the upstream suppliers. The non-strategic partner relationship was mainly transactional.

Secondly, low trust was another vital barrier, since it emphasized minimum trust of other people. Company A believed it was very risky to trust and rely on a single supplier. At least two to three suppliers had to be available for each item to avoid being threatened
by a single supplier. As a result, it was very hard for Company A to rationalize the supply base as their international partners did.

Table 4.5 Summary of Collaborative Synchronization

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Domestic Customer</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative Synchronization</td>
<td>Not observed</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>SC Visibility</td>
<td>Very low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPF</td>
<td>Not observed</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>IO</td>
<td>Not observed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative Innovation</td>
<td>Involved</td>
<td>Involved</td>
<td>Involved</td>
</tr>
</tbody>
</table>

Thirdly, implementation of inter-organizational information system was very difficult. Company A had exerted great effort in rolling out the Web-based platform for collaboration with its SC partners. Even though a few sessions of training were provided to suppliers, they still preferred to receive faxes instead of logging onto the online system, due to various problems such as the low speed of Internet or the poor interface of the systems, giving the user extra work. Some suppliers were small family businesses but critical to Company A because of their great flexibility and core technology. Not only were they lacking the capability to use the information system, they also did not have confidence in the future of the manufacturing industry and were unwilling to make further investment and expansion.

Interestingly, even though Guanxi was prevalent in China, the Vice President regarded it as unimportant for the SCC initiative of Company A. In fact, she would consider it harmful to the healthy development of business. Company A did not show favour to suppliers who had Guanxi with someone who worked in the company.

An overall summary of the SCC initiative of Company A based on the within-case analysis is shown in Table 4.6. A cause-effect analysis of major problems with SCC between Company A and SC partners is displayed in Figure 4.2.
<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Domestic</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOA</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Executive Sponsorship</td>
<td>Proactive involvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Sharing</td>
<td>Extensive</td>
<td>Limited</td>
<td>Limited</td>
</tr>
<tr>
<td>Information Connectivity</td>
<td>Well connected</td>
<td>Well connected</td>
<td>Well connected</td>
</tr>
<tr>
<td>Information Quality</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Willingness to Share</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>SC Partnering</td>
<td>Collaborative</td>
<td>Adversarial collaboration</td>
<td>Adversarial collaboration</td>
</tr>
<tr>
<td>Incentive Alignment</td>
<td>Properly shared</td>
<td>No risk sharing</td>
<td>No risk sharing</td>
</tr>
<tr>
<td>Supplier Development</td>
<td>Direct</td>
<td>Indirect</td>
<td>Internalization</td>
</tr>
<tr>
<td>Mutual Trust</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Power Asymmetry</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Process Integration</td>
<td>Require further integration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JIT</td>
<td>Mature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lean</td>
<td>Better than domestic firms but far behind Best-in-Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution Process</td>
<td>Not designed.</td>
<td></td>
<td>Less than demand/supply maturity.</td>
</tr>
<tr>
<td>Collaborative Synchronization</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>SC Visibility</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPF</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>IO</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMI</td>
<td>Yes</td>
<td>Yes</td>
<td>Partial imitation</td>
</tr>
<tr>
<td>Collaborative Innovation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Major Barriers</td>
<td>- Unwillingness to share costs and risks.</td>
<td>- Transactional relationship.</td>
<td>- Low level of trust.</td>
</tr>
</tbody>
</table>
Figure 4.2
Cause-effect analysis of major problems with SCC between Company A and SC partners.
4.2 Case B

4.2.1 Overview

Company B is one of the most famous manufacturers producing E & E house appliances in China. Their products are sold in the domestic market through multiple levels of franchisees and major retailers. This company is a focal manufacturer that collaborates with domestic franchisees, major retailers and suppliers. The position of Company B in the SC can be illustrated as in Figure 4.3.

Figure 4.3 The Supply Chain Position of Company B

4.2.2 Supply Chain Objective Alignment

SC objectives between Company B and its SC partners were partly aligned through agreement (see Table 4.7). Common goals with strategic suppliers were identified and established. However, some of the suppliers were speculative, signing the agreements out of concern that they might lose the business if they refused to do so. They believed that those agreements were employed by Company B to take advantage of them rather than to truly take care of their benefits. Thus, the convergent interest effect of objective alignment was largely undermined. Inevitably, a large amount of time had to be spent on further discussion and negotiation with those suppliers when a certain divergence occurred, so that their speculative attitude and behaviour could be rectified. The Production Manager of Company B stated that:

“When it came to SCOA, the first issue that had to be resolved was to set common ground on the corporate culture and the value proposition with suppliers. It was easy for suppliers to say it, but very hard for them to agree with it from the bottom of their hearts. Although agreement was signed by both parties, conflicts and divergences arose when certain issues were encountered. When I went to..."
suppliers’ sites to expedite supply of parts, the first thing was to discuss the common value proposition with them. Whether it could be agreed by both parties or not was the pre-requisite to continue the discussion about supply planning at the strategic level. Normally, most of the top management of suppliers agreed with me. However, when it came to specific issues, conflict still existed. It could be very painful when resource allocation and money issues were involved. As a result, I had to ask suppliers to look backward to see if their market position and business share had grown as a result of their collaboration with us. If suppliers anticipate a long-term business relationship with us, their short-term benefits must comply with the long-term common goals. Functional objectives must espouse strategic aims.”

Production Manager, A-5-1

Thus, common objectives between Company B and its SC partners had to be further aligned properly.

4.2.2.1 Executive Sponsorship

Executive sponsorship was critical to the implementation of SCC initiatives in Company B (see Table 4.7). Although the CEO was uncertain whether the advertised benefits of SCC, such as substantial cost reduction, performance improvement, and profit increase, could be realized, he chose to be open-minded and supportive. Senior managers also claimed repeatedly that the involvement of the CEO was essential for the roll-out of the initiative. Some tasks would be impossible to be executed if other departments or functional areas resisted, unless the CEO took charge of the situation. The executive sponsorship on the supplier side was also critical for tackling issues and prompting collaboration between two parties. If any problems occurred on the supplier side, the only way to solve them was to communicate with the CEO directly. Thus, executive sponsorship was fundamental to the implementation of SCC between Company B and its SC partners.

4.2.2.2 Incentive Alignment

While JIT Purchasing (JIT-P) was implemented by Company B, they started to consider sharing the extra cost that was caused by smaller order quantities and more frequent deliveries on the supplier side (See Table 4.9). Some suppliers refused to provide JIT
delivery on the condition that the cost of delivery increased while the purchasing price remained same. If Company B wanted suppliers to cooperate to realize JIT-P, they had to share part of the extra cost with suppliers. Company B promised to take responsibility and compensate for all excess inventories:

“It is unnecessary to let suppliers be burdened with all costs. In order to make some improvement, it is quite necessary to share the extra costs fairly between two parties.” Warehouse Manager, A-3-4

Given that the prices of raw materials had rocketed sharply, Company B worked together with suppliers to avert risks. The price adjusting agreement for copper, plastics and other parts was signed between Company B and those suppliers. In an effort to ensure that the profits of Company B and suppliers were not affected by price fluctuation, the prices of components were adjusted monthly according to the prices of raw materials. An equation was designed by Company B to guarantee the comparative rationality and visibility of the prices. If unexpected market pressure emerged and forced Company B to give up some profit, suppliers also needed to share the risks and surrender part of the profit. Therefore, some of the costs and the risks were shared between Company B and its SC partners.

**Table 4.7 Summary of SCOA Practices**

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Franchiser</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOA</td>
<td>Partly aligned with franchisers.</td>
<td>Suppliers’ agreement with common goals was speculative.</td>
</tr>
<tr>
<td>Executive Sponsorship</td>
<td>The involvement of the CEO was critical to the implementation of SCC practices.</td>
<td></td>
</tr>
<tr>
<td>Incentive Alignment</td>
<td>Incentives were provided to encourage more accurate forecasts and meeting sales goals.</td>
<td>Extra costs caused by smaller order quantities and more frequent deliveries associated with JIT initiatives were to be shared.</td>
</tr>
</tbody>
</table>

**4.2.3 Information Sharing**

Part of tactical information was shared between Company B and its SC partners (see Table 4.8). One of the major problems of information sharing with franchisees was the enormous difficulty in collecting information from them. Consequently, Company B had no access to actual demand information about their products:
“It might be possible for us to collect data from the first-level franchisees that are interacted directly. However, it was incredibly difficult to collect all information from the second-level, the third-level, down to each terminal. Franchisees were very speculative and did not share right information or resisted sharing information with us at all.”

Customer Service Manager, A-2-2

A Web-based platform was available to share information with suppliers. Most of information shared by Company B was limited to announcement of purchasing plan to facilitate suppliers’ daily operations. Company B did not share any inventory information with suppliers. Nevertheless, suppliers were required to upload their inventory information through the Web-based information system. Basically, accurate demand and supply information from both franchiser and supplier side couldn’t be collected. Realization of information sharing with its SC partners was set as one of the main goals of Company B for the next three years.

4.2.3.1 Information Connectivity

Information connectivity within Company B and with its SC partners was not yet realized (see Table 4.8). Although a few information systems were implemented within Company B, different departments remained unable to share information with each other. Interfaces were needed to integrate various information system so that isolated information islands within the organization could be removed:

“All departments such as marketing, purchasing, production and sales need to be linked and integrated through information system. Large amounts of data have to be aggregated and shared between different functions.” Customer Service Manager, A-2-2

Before the CRM system was implemented, two information systems had been deployed by Company B for better customer service. But there was no communication between points of sale, marketing department, and after-sales service department. Hence, the CRM system was under building in an aim to facilitate the collection of accurate demand information and enhance its demand management capability.

Although a simple Web-based platform was available for suppliers to share their purchasing plan and inventory information, fax was the main tool to send weekly plans
to suppliers. A more comprehensive SRM system was under development for sharing more information with suppliers and entering of original data. With the completion of SRM, each supplier would have to send real-time data to Company B, reporting which products were on their production lines, and where the bottlenecks of processes and the quality control points were. This system was planned to be rolled out among strategic suppliers first.

4.2.3.2 Information Quality

Owing to the lack of information system, the majority of information communications between Company B and SC partners were done manually (see Table 4.8). Valuable sales information could not be effectively collected and used for forecasting and planning, since it was recorded manually based on the ID of the products. Many manual mistakes resulted in poor decision making on the supplier side. Inaccurate forecasting and planning information had caused serious problems, such as being out of stock and overfull warehouse.

Normally, information provided by the suppliers was timely and accurate. However, out of self-protection, some important information could be withheld by the suppliers if any issues occurred. Concerned that Company B could place orders to other suppliers or to avoid severe punishment, the suppliers tended to cover a fact and would only report a problem as a last resort.

Company B paid great attention to improving the accuracy of information as it understood that accuracy was of the essence. Strict policy was used to ensure that franchisees place new orders and make adjustments in a timely manner. Incentives and punishment were also applied to prompt franchisees to guarantee the accuracy of order quantity. For instance, if the quantity of new orders were accurate and on-time, franchisers would have the priority to pick up finished goods. If inaccurate or late orders were placed, franchisees might not get the products unless there was any stock available. Suppliers were also required to ensure the accuracy of information. The supplier management department went to suppliers’ sites to verify the accuracy of information and make sure appropriate processes were executed and no inferior materials were used.
4.2.3.3 Willingness to Share

Company B and its SC partners were unwilling to share information with each other (see Table 4.8). Firstly, Company B was the focal manufacturer, and therefore had more power to control franchisees and suppliers. Company B requested SC partners to provide information but tended to screen and retain as much information as possible:

“Suppliers are not allowed to see our information except those closely related to their operations. Instead of sharing inventory information with suppliers, we prefer to make sure suppliers’ inventory information is visible to us. Similarly, franchisees are not allowed to see our information as well since some of them are very cunning.” IT Manager, A-1-1

While Company B engaged in building up more integrated information systems such as SRM and CRM, managers were concerned about the unwillingness of multi-level franchisees to enter information into the system. Although plenty of information was available, franchisees did not cooperate and simply did not think it was their responsibility to enter information into the system, largely because they were unaware of the importance of information sharing to business success. As a result, Company B had to adopt management mechanisms to restrain franchisees to guarantee that important information would be shared. Win-win approaches were also under design to encourage franchisees to enter information into the system by rewarding them with more information about new products or promotions.

Table 4.8 Summary of Information Sharing Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Domestic Franchisee</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Information Sharing</strong></td>
<td>Tactical and operational information was partly shared with franchisees but very hard to collect information from franchisees.</td>
<td>Limited information was shared with suppliers but required them to share information.</td>
</tr>
<tr>
<td>Information Connectivity</td>
<td>Multiple information systems were rolled out but incompatibility resulted in prominent information isolation islands.</td>
<td>A simple Web-based platform was available to connect with suppliers.</td>
</tr>
<tr>
<td>Information Quality</td>
<td>Too much information but inaccurate or insufficient information was available.</td>
<td>Sometimes important information was withheld by suppliers out of self-protection.</td>
</tr>
<tr>
<td>Willingness to Share</td>
<td>Franchisees were unwilling to share information and unaware of the importance of information sharing.</td>
<td>Unwilling to share valuable information with each other.</td>
</tr>
</tbody>
</table>
4.2.4 SC Partnering

Acknowledging that future competition would be the competition between SCs, Company B started to identify some strategic vendors and develop its own strategic supply base to facilitate joint development (see Table 4.9). Since key components and spare parts were vital to Company B’s competitive advantage in the market, those suppliers were treated as the most important SC partners. Company B communicated frequently with suppliers and listened to their voices rather than playing the bully as had other focal manufacturers.

While Company B was trying to build up partner relationships with suppliers, conflicts with suppliers still existed. In particular, it was very difficult to calculate cost or persuade suppliers to give up part of profits to launch promotions. After all, each SC member still focused on its own interests and attempted to maximize local benefits.

4.2.4.1 Supplier Development

Company B engaged in the development of a strategic supplier base and was moving towards a quality- and technical-oriented stage instead of cost minimization (See Table 4.9). While it was prevalent for most of focal manufacturing firms to source from the cheapest suppliers, Company B started to share suppliers’ cost in lieu of demanding endless price squeezing. Therefore, Company B’s supplies were relatively stable owing to the fact that the reasonable profit of suppliers was assured and the organizational culture was acceptable for the suppliers.

Company B paid more attention to the interests of those qualified suppliers and adopted preference purchasing strategies. Those qualified suppliers were usually awarded with larger order proportions. During a certain period, the profit of a particular item could decrease but suppliers’ annual profit could be guaranteed. Company B spent efforts in maximizing suppliers’ production capacity so that extra management cost could be avoided and lowest production cost could be accomplished. If an order was placed to suppliers, Company B took full responsibility, even if the ordered parts might have become obsolete. In general, suppliers were relatively more satisfied with Company B than its competitors.

Some training was provided by Company B to suppliers so that they could understand
the importance of SCC initiatives. Despite JIT delivery being employed, suppliers did not understand that this initiative could improve their efficiency and capability. They cared only about the extra cost incurred and the part of profits they lost. They could not understand that their business portion would be increased if they could provide JIT delivery smoothly. In order to change suppliers’ mindset and have better supply rhythm, suppliers were invited to participate in various trainings for implementation of SCM initiatives such as JIT and lean manufacturing. As a result, suppliers made significant improvements.

Although no direct investment was made by Company B in suppliers, some assistance and support was provided. In comparison with other firms, Company B offered fair payment terms instead of requiring unreasonable payment conditions. Engineers were sent to suppliers’ sites to assist them to improve logistics, technology and product quality. Annual supplier meetings were held to obtain suppliers’ feedback and suggestions. Company B also headhunted for some suppliers to fill major positions. As a result of Company B’s great efforts in supplier relationship management, the current relationship with strategic suppliers was better than the pure traditional, transactional relationship:

“We are the common interest community of the same supply chain. We choose to work together, bearing the same goal to serve customers. The only difference is the division of labour. Our major competitive advantage is the whole assembly, channel and marketing. We need our suppliers’ support in terms of manufacturing, technology competitiveness, process improvement and quality control. By relying on transactional relationships, we won’t be able to obtain their latest innovation for key bottleneck material or component parts.”
Production Manager, A-4-1

However, some suppliers were satisfied with their current business scale and had no intention to make further development. They were reluctant to expand investment, fearing potential risks, since they had little confidence in the future of the manufacturing industry in China. As long as they did not lose money for manufacturing, they preferred to invest money in the booming real estate industry instead.
4.2.4.2 Low Mutual Trust

The level of trust and commitment between Company B and its SC partners was low (see Table 4.9). Company B did not trust its SC partners because they believed both franchisees and suppliers were very speculative. For example, franchisees tended to report unreal sales information to earn more rebates. Similarly, some suppliers frequently acted opportunistically. Some suppliers worried that Company B might find other suppliers to replace them. They were also concerned that other suppliers might outbid them by providing lower prices; vice versa, Company B suspected that suppliers might have other better customers and put them as the first priority. It also suspected whether the prices quoted by suppliers were absolutely transparent and whether inferior raw materials were used by suppliers. Overall, Company B and its SC partners did not trust each other.

4.2.4.3 Power Asymmetry

Power asymmetry between Company B and SC partners was prominent (see Table 4.9). In order to shift inventory downstream, some franchisees were forced to pick up finished goods as soon as they were produced. Some discounts were offered to attract franchisees to hold more inventory. Subsequently, inventory accumulated in franchisees’ warehouses instead of being in the focal manufacturers’ possession. Thus, power asymmetry existed between Company B and its SC partners. However, Company B realized the negative impact of coercive power on supplier relationships.

<table>
<thead>
<tr>
<th>Table 4.9 Summary of SC Partnering Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key Elements</strong></td>
</tr>
<tr>
<td><strong>SC Partnering</strong></td>
</tr>
<tr>
<td>Supplier Development</td>
</tr>
<tr>
<td>Mutual Trust</td>
</tr>
<tr>
<td>Power Asymmetry</td>
</tr>
</tbody>
</table>

However, Company B realized the importance of fair collaboration with its SC partners. It believed that bullying weak partners was inappropriate. Traditionally, focal
manufacturers were arrogant and held as much information as they could from their suppliers. Currently, Company B understands the strategic importance of suppliers to them and inclines to share more information with them. For instance, if only weekly supply planning was provided, suppliers would have no idea about monthly and annual plans, how peak and off-peak season was distributed and how yearly production capacity was planned. Therefore, it was very hard for suppliers to make accurate analysis and take joint action. If all important information, such as yearly production capacity and promotion plans, was released to suppliers, they could collaborate more closely. If any problems occurred on the supplier side, Company B would manage to communicate with them thoroughly rather than playing a bullying role.

4.2.5 Process Integration

The end-to-end SC process of Company B needed to be substantially integrated and streamlined to improve efficiency and reduce inventories (see Table 4.10). Evaluation of the whole operation process was essential, since some processes were very cumbersome and required optimization. Although standardization of process was acknowledged by all managers, it was never truly implemented. Many problems occurred as a result of its weak process management capability. For instance, some low-level mistakes were made which caused serious quality problems. In order to prevent this kind of mistake, the production department had to redesign the whole manufacturing process from scratch as meticulously as they could. At this stage, numerous aspects had to be improved significantly.

Better process coordination between Company B and its suppliers enabled higher efficiency and lower cost. For example, purchasing volume was aggregated to facilitate continuous production for suppliers. Some parts outsourced from two vendors were centralized and produced by one of them so that minimization of cost could be achieved. Consequently, efficiency was also enhanced, since the number of items was reduced and order quantity was enlarged. Moreover, Company B did not just take away one supplier’s quota and give it to the other. Instead, they compensated the supplier with other products, therefore facilitating integration of production scale. Early plans were provided to suppliers so that lead time could be long enough for better preparation of raw materials and adjustment of production capacity for lower production costs. More synchronized production could be achieved by Company B with a few strategic
suppliers.

4.2.5.1 Developing Just-In-Time Initiative

JIT-P was adopted by Company B a few years ago (see Table 4.10). So far, more than 70 per cent of spare parts were delivered by suppliers within half an hour to two hours, so that excessive inventory could be minimised. Some key valuable components were supplied on time and delivered directly to the production line in 4 to 8 batches every day. As a result, no inventory of this type of component was stocked. Company B anticipated implementing the JIT-P initiative to more suppliers, but had to overcome some major obstacles such as cost sharing and quality problems.

Standardization of packaging was crucial for the improvement of efficiency. Before standardized packaging was adopted by Company B, anything, such as newspaper or carton, could be used by suppliers to pack component parts. When the components arrived at Company B, they had to be repacked, which caused too much waste and also was not environmentally responsible. In order to realize JIT-P, Company B tried to find a one-off solution to avoid duplicated work, by setting the standard for packaging based on the production rhythm, production capacity, and the character of spare parts. As a result, standardized packaging in different sizes were sent to the suppliers to facilitate efficient hourly JIT-P in small batches. Upon this change, Company B could put the component parts onto the production line straight away instead of opening every box to double-check the quantity and quality. All packaging materials could be sent back to the suppliers for reuse. Thus, considerable effort had been made in the standardization of packagings by Company B.

4.2.5.2 Early Lean Manufacturing

Lean manufacturing was rolled out in a small scale in Company B from 2009 (see Table 4.10). Managers were sent to Japan to learn from the best practices. Some specialists on lean manufacturing were also invited over to provide training and consultancy service. Currently, the lean initiative was applied to the whole company rather than to any particular function. As a result, significant improvement with the inventory level was realized and the quality of products was slightly enhanced. Since the assembly process was simple, only minor changes, such as streamlining the whole process including
pressing, welding and polishing through the change of layout, could be made. Participation of all workers had yet to be achieved, since improvement of workers’ qualifications took time, and payment was calculated based on quantity rather than quality of parts finished. Overall, lean manufacturing of Company B was at a very early stage.

4.2.5.3 Immature Sales and Operations Planning Process

The S&OP process of Company B was deemed to be immature (see Table 4.10). No sophisticated forecasting tools were adopted to manage demand volatility. Forecasting of Company B was mainly based on historical data and qualitative estimation. According to previous sales, franchisees from more than 10,000 points of sale computed their approximate sales for the next month and sent the forecasts to Company B on the 10th of every month. A slight adjustment was allowed to be made within a limited scope after promotion information and other demand-shaping activities were announced.

Based on the sales plan, a weekly and monthly purchasing plan was generated accordingly. A rolling 3+3 forecast for the next six days was made every day. The plan could not be changed for the first 3 days but could be adjusted slightly for the next 3 days. Therefore, the production cycle of this type of item was limited to 6 days. If any production cycle was more than 6 days, the 3+3 rolling plan could not be applied. As a result, suppliers with production cycles longer than 6 days had to adjust their production cycle through splitting processes, changing layout or replacing facilities.

Company B sent the aggregate demand forecasts to inform suppliers the delivery requirements of materials for the next three days and the next six days. As a result, suppliers acknowledged the customer’s production plan for the next week. Meanwhile, suppliers shared a copy of their master production plan and current inventory level with Company B. Finally, components were delivered to Company B as requested. Overall, the S&OP process of Company B was under improvement, and a formalized S&OP process had to be established.

4.2.5.4 Distribution Process

Traditionally, franchisees and suppliers took the responsibility to arrange 3PLs to pick
up or deliver goods (see Table 4.10). In this way, all transportation costs and risks were passed onto them. However, Company B realized that the distribution and logistics processes throughout the country had to be systematically redesigned and integrated for lower cost. The distribution network within the Pearl River Area was already under design. Three to four distribution centres were also considered to be set up around the country to improve responsiveness and reduce logistics costs.

A Warehouse Management System (WMS) had been rolled out for five months and was being re-examined thoroughly. The whole warehouse operation process had to be optimized to enable high accuracy and efficiency. The quality inspection procedure had to be moved forward to suppliers’ production lines or removed to facilitate JIT delivery. A small portion of spare parts were delivered to the production line directly and able to match the production rhythm. The new WMS was expected to lower inventories immensely.

The unloading operation at the warehouse for finished goods was reorganized. Usually, every supplier had to send a few workers together with components to unload and move goods into Company B’s warehouse, which caused chaos and significant waste. For the time being, a third party was employed to be responsible for the unloading tasks, which lowered both costs and management risks of suppliers and improved efficiency.

Table 4.10 Summary of Process Integration Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Domestic Franchisee</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process Integration</strong></td>
<td>Process efficiency was low, therefore substantial end to end integration was required.</td>
<td></td>
</tr>
<tr>
<td>JIT</td>
<td>More than 70 per cent of spare parts were delivered by suppliers within every half-hour to two-hour.</td>
<td></td>
</tr>
<tr>
<td>Lean Manufacturing</td>
<td>Only minor improvement can be made such as streamlining the whole manufacturing process. Participation of all workers cannot be achieved yet.</td>
<td></td>
</tr>
<tr>
<td>Distribution Process</td>
<td>The distribution process needed to be redesigned systematically.</td>
<td></td>
</tr>
<tr>
<td>S&amp;OP</td>
<td>S&amp;OP process was under improvement.</td>
<td></td>
</tr>
</tbody>
</table>

4.2.6 Collaborative Synchronization

Collaborative synchronization between Company B and its SC partners was not observed.
4.2.6.1 SC Visibility

SC visibility of Company B was extremely low due to the existence of information isolation islands (see Table 4.11). Since franchisees did not share accurate data with Company B, it was impossible to know how many products had actually been purchased by consumers and how many products were still sitting in the warehouses of multiple levels of franchisees. Company B strived to improve SC visibility so that the puzzle of how much idle inventory existed throughout the whole SC could be resolved. In the hope of improving SC visibility and collecting all valuable information, a CRM information system was employed by the company.

4.2.6.2 No Synergistic Planning and Forecasting

Synergistic planning and forecasting between Company B and SC partners was not observed (see Table 4.11). Although 3+3 rolling forecast and planning was implemented, the demand planning process of Company B remained unsynchronized. Despite input from multiple roles, such as sales and marketing, being used to forecast demand, forecast accuracy was low. Demand segmentation by products was also considered when new promotions were launched. As the Omni-channel fulfilment demands increased and Business-to-business (B2B) business models continued to converge with Business-to-consumer (B2C) direct-to-customer business, synchronization of demand planning processes had become critical for Company B to manage demand variation and increased SC complexity, and to lower inventory level across the pipeline.

4.2.6.3 No Inventory Optimization

The inventory turnover of Company B was about ten days (see Table 4.11). The finished goods were normally kept in the warehouse for a maximum of three days. Most of them were delivered on the day they were produced. With the application of JIT-P and lean manufacturing, the inventory level was lowered by nearly 30 per cent.

However, with the extremely low SC visibility, it was impossible for Company B to know how much inventory had accumulated at various stages of the SC. It became urgent for Company B to adopt IO solutions to reduce inventory obsolescence and lower inventory carrying cost, and make informed and intelligent stocking decisions.
4.2.6.4 Collaborative Innovation

The importance of collaborative innovation was acknowledged by Company B and its SC partners (see Table 4.11). If a new product was to be developed, the R&D department communicated with the suppliers so that they were involved throughout the whole NPD process. Suppliers were consulted for the design of outline, structure, selection of components and so forth, as they were the experts in making the different components. It could be seen that Company B started to leverage collaborative innovation to enhance its competitive advantage.

Table 4.11 Summary of Collaborative Synchronization

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Domestic Franchisee</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collaborative Synchronization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC Visibility</td>
<td>Extremely low SC visibility</td>
<td>Not observed</td>
</tr>
<tr>
<td>SPF</td>
<td>Although 3+3 forecast and planning was adopted, SPF remained unsynchronized.</td>
<td>Not observed</td>
</tr>
<tr>
<td>IO</td>
<td>Adoption of IO was necessary to gain insight into inventories accumulated at multiple points.</td>
<td></td>
</tr>
<tr>
<td>Collaborative Innovation</td>
<td>Suppliers were involved throughout the NPD process.</td>
<td></td>
</tr>
</tbody>
</table>

4.2.7 Barriers to SCC

The implementation of SCC was hindered by various barriers. Firstly, lack of IOS was one of the major problems. The ERP system was not useful, since too many individualized applications were required. The information system was internally isolated and unintegrated with upstream and downstream SC partners. Lack of funds, complex organization structure, information insecurity, and multiple hidden rules were parts of the hindrance.

Secondly, SC partners were unwilling to share information with Company B, out of protection of own interests or simply because they did not have computer hardware or skills. Thirdly, low level of trust among SC partners was a critical factor hampering the adoption of SCC. Some suppliers did not trust Company B and were deeply suspicious about the possibility of long-term cooperation between each other. Fourthly, there was strong resistance from employees of different functions to change their old working habits. Rolling out SCC was almost impossible unless the CEO was in charge of the...
project himself. Fifthly, SCM demanded a huge workload and continuous effort. The outstanding performances and benefits could not be achieved in a short period. Lastly, most of the suppliers had no intention to improve SCM capabilities due to lack of knowledge of SCM and pessimism about future business. While they were facing cut-throat competition and could hardly maintain any profit margin, suppliers had no motivation to make further investment in the manufacturing industry, but preferred to invest in the booming real estate industry.

Guanxi was used by some suppliers to build up business relationships with Company B. However, they still needed to compete fairly with other suppliers by providing the most competitive price, service, quality, and supply capability. Otherwise, other suppliers with no Guanxi would win business. In other words, Guanxi provided an opportunity to certain suppliers to make quotations but had no impact on Company B’s sourcing decisions.

A summary of SCC initiatives of Company B is shown in Table 4.12. A cause-effect analysis of major problems with SCC between Company A and SC partners is displayed in Figure 4.4.
### Table 4.12 Summary of SCC Initiative of Company B

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Domestic Franchisee</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SCOA</td>
<td>Strategic</td>
</tr>
<tr>
<td>Executive Sponsorship</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Information Sharing</td>
<td>Tactical</td>
<td>Tactical</td>
</tr>
<tr>
<td>Information Connectivity</td>
<td>Unconnected</td>
<td>Unconnected</td>
</tr>
<tr>
<td>Information Quality</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Willingness to Share</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>SC Partnering</td>
<td>Adversarial collaboration</td>
<td>Better than adversarial</td>
</tr>
<tr>
<td>Incentive Alignment</td>
<td>No risk sharing</td>
<td>Started to share</td>
</tr>
<tr>
<td>Supplier Development</td>
<td>N/A</td>
<td>Indirect</td>
</tr>
<tr>
<td>Mutual Trust</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Power Asymmetry</td>
<td>Reward power</td>
<td></td>
</tr>
<tr>
<td>Process Integration</td>
<td>Require substantial integration</td>
<td></td>
</tr>
<tr>
<td>JIT</td>
<td>Early implementation</td>
<td></td>
</tr>
<tr>
<td>Lean</td>
<td>Early stage</td>
<td></td>
</tr>
<tr>
<td>Distribution Process</td>
<td>Not designed</td>
<td></td>
</tr>
<tr>
<td>S&amp;OP Process</td>
<td>Immature</td>
<td></td>
</tr>
<tr>
<td>Collaborative Synchronization</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>SC Visibility</td>
<td>Extremely low</td>
<td></td>
</tr>
<tr>
<td>Synchronized DP</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>IO</td>
<td>Lack of visibility of inventories</td>
<td></td>
</tr>
<tr>
<td>VMI</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Collaborative Innovation</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Major Barriers
- Lack of inter-organizational information system.
- Unwillingness to share information between SC partners.
- Lack of sufficient information to make accurate forecasting.
- Complex organization structure is a major obstacle to collecting sales information.
- Strong resistance among different functions and difficulties in changing inertia.
- Low level of mutual trust hampered the adoption of SCC practice.
- SCM demands massive amount of workload and continuous effort.
- Most suppliers have no intention to improve SCC capabilities because they lack confidence.
- *Guanxi* was revealed to be non-critical to building up strategic relationships.
Figure 4.4
Cause-effect analysis of major problems with SCC between Company B & SC partners

Major Problems with SCC between Company B and SC Partners
4.3 Case C

4.3.1 Overview

Company C is a leading manufacturer producing gas appliances in China. Their products are exported to major retailers around the world. Thus, this company is a focal manufacturer that collaborates with international customers. The position of Company C in the SC can be illustrated as in Figure 4.5.

Figure 4.5 The Supply Chain Position of Company C

4.3.2 Supply Chain Objective Alignment

There was no SCOA between Company C and its SC partners.

4.3.2.1 Executive Sponsorship

The CEO of Company C preferred to be conservative out of self-protection, especially for new products, new technologies and new facilities (see Table 4.13). This was mainly because many employees who previously worked for the company learned the knowledge and technologies and then quitted. They later started their own businesses in the same industry to become Company C’s competitors.

4.3.2.2 Incentive Alignment

International customers shared risks with Company C if the exchange rate fluctuated dramatically (see Table 4.15). Some good customers paid more attention to the quality of service and the healthy development of their suppliers’ business instead of lowest purchasing price. Company C worked together with customers to reduce costs through collaborative effort on design, production, optimization of structure and processes.
Company C held a sharp, clear principle on risk sharing with suppliers. Bids were invited to lock the sourcing prices. Once the contract was signed, no matter how the prices of raw materials fluctuated, suppliers had to fulfil their commitment. If the price of raw materials surged, suppliers had to cope with the situation by themselves. If the price of raw material dropped, suppliers did not have to share the saving with Company C as well. Apparently, there was no cost and risk sharing between Company C and its suppliers.

Table 4.13 Summary of SCOA Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOA</td>
<td>No objective alignment.</td>
<td>No objective alignment.</td>
</tr>
<tr>
<td>Executive Sponsorship</td>
<td>The CEO was conservative.</td>
<td></td>
</tr>
<tr>
<td>Incentive Alignment</td>
<td>International customers shared risks caused by drastic exchange rate fluctuation.</td>
<td>No risk sharing with suppliers.</td>
</tr>
</tbody>
</table>

4.3.3 Information Sharing

A few major international customers shared valuable information with Company C through a Web-based platform (see Table 4.14). To meet customers’ requirements, Company C uploaded information on finished orders, inspection and delivery onto the customers’ Web-based information platform.

In contrast, Company C shared as less information as possible with suppliers, through fax, email and telephone. The purchasing department was the only department communicating with suppliers. With regard to information sharing, the Purchasing Manager held a very conservative perspective, as shown below:

“Using an IT platform to share information may reduce manual mistakes but can also cause problems to ourselves. Instead of sharing our information with suppliers, we prefer to learn more about our suppliers’ inventory. It is unnecessary to share our inventory information with them. They can make estimation based on the new orders we placed.” B-3-6

Therefore, very limited information was shared with suppliers by Company C.
4.3.3.1 Information Connectivity

Company C was internally connected through the ERP system, which included major functions such as sales, purchasing, production, quality control, warehouse, customer service, and R&D (see Table 4.14). Big customers like Wal-Mart had RetailLink, which incorporated the whole process from quotation to order fulfilment and delivery. Other medium and small customers used email for communication.

Suppliers were in short supply of information system. Some of them did not even use email. If those suppliers could not upgrade their information systems in tandem with Company C, it would be difficult to share information between the two companies. If new suppliers were to be introduced, those who were capable of sharing information with other leading manufacturers would be preferred.

4.3.3.2 Information Quality

Although Company C was internally connected through the ERP system, information was not shared in a timely manner due to failure of staff to enter information into the information system immediately (see Table 4.14). Feedback on the quality of spare parts was not put into the information system to enable prompt communication between the purchasing department and the suppliers. Information about defective products or return orders was not updated in the information system instantly, only because warehouse staff forgot to do so. Overall, the quality of information shared by Company C with SC partners was low.

4.3.3.3 Willingness to Share

Out of concern for information insecurity, Company C was very sensitive about information sharing (see Table 4.14). If any electronic devices, such as portable disk or memory stick, had to be taken out of the office, they had to be examined to make sure no important information or documents was stored in these devices. Company C preferred to obtain suppliers’ information rather than sharing its own information with them. The reason why Company C was so concerned about information insecurity was explained by the IT Manager:

“Our company is like the Huangpu Military Academy. Many employees..."
worked here before then left and started their own business in the same industry. It means that we created many competitors. Therefore, our CEO chooses to be very conservative as far as information sharing and security is concerned.”

Table 4.14 Summary of Information Sharing Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Sharing</td>
<td>Shared clear forecasting and planning information, also required Company C to upload information.</td>
<td>Shared as less information as possible with suppliers.</td>
</tr>
<tr>
<td>Information Connectivity</td>
<td>Well-connected information systems.</td>
<td>Shortage of inter-organizational systems.</td>
</tr>
<tr>
<td>Information Quality</td>
<td>Accurate and timely information sharing.</td>
<td>Very limited information sharing with suppliers.</td>
</tr>
<tr>
<td>Willingness to Share</td>
<td>Willing to share required information with customers.</td>
<td>Preferred to know more about suppliers’ information rather than share own information with them.</td>
</tr>
</tbody>
</table>

4.3.4 SC Partnering

Company C expected to build up strategic partner relationships with customers to achieve a win-win outcome (see Table 4.15). The current relationship with customers ranged from transactional to collaborative, varying across different types of customers.

Cost minimization was the most prevalent strategy employed by the majority of customers. Some of them demanded Company C offer the lowest prices. In turn, Company C would demand its suppliers quote the most competitive prices. If it was unable to match the target price of a customer, Company C would negotiate for lower specifications of the product. Some customers even requested 15 per cent of cost reduction straight away. Clearly, price squeezing was a prevalent outsourcing strategy of customers.

Based on previous performance of the suppliers, Company C categorized them from strategic to back-up suppliers. The share of business for each supplier was determined by their performance in terms of quality of products, on-time delivery, cooperative attitude, and amount of investment.

Payment term was a critical factor for Company C to evaluate the performance of suppliers. Owing to the long cash cycle time pertaining to export business, Company
C needed a certain period to receive the payment from international customers after the goods were produced, inspected, delivered and received by the customers. Consequently, it was impossible for Company C to process the payment in a short time. About 90 per cent of the suppliers were able to meet the payment term of three months.

Company C started to integrate the supplier base and had reduced 100 of them. Company C’s sourcing strategy is reflected in the following explanation made by the Purchasing Manager:

“We don’t want to cooperate with very small suppliers with annual sales less than RMB100,000. We need to find those suppliers with a solid foundation. They are preferred if they supply to leading manufacturers in the same industry, which means that they have experience of managing inter-organizational information system and mass production capability.”

4.3.4.1 Supplier Development

Indirect supplier development initiatives were provided by Company C to assist suppliers in quality improvement, production efficiency, technology, cost reduction, and capital (see Table 4.15). A special department was set up to help suppliers to make improvements. For example, Company C would help suppliers to streamline their production process to improve efficiency so that less investment had to be made. If the quality of components did not meet the standard, the R&D department would send staff to the suppliers’ plants to optimize the structure of the component. Technology supervision and enhancement was also offered by Company C to lift B-level suppliers to A-level. If the target cost of a component was one dollar, Company C would help the supplier to reduce the cost from five dollars to one dollar.

Occasional financial support was provided by Company C to suppliers. If suppliers asked for payment in advance to stock more inventories when prices of raw materials were comparatively low, Company C usually considered comprehensively and weighed the pros and cons carefully. As the Purchasing Manager put it:

“Although it is called strategic relationship, if money is the issue, we have to be very careful and clear.”
If any training was organized at Company C, the top management, technical staff and production managers of the suppliers were invited to participate in those activities. Both parties would sit together to discuss how new products could be improved, what kind of new parts could be used, and how the performance of products would be affected by new parts. Systematic training in terms of ISO9000, production and planning were arranged for twenty to thirty suppliers every year.

4.3.4.2 Low Mutual Trust

The level of trust between Company C and its suppliers was low (see Table 4.15). Since Company C normally demanded 90 days of payment term or even longer, some suppliers asked for cash payment and would not deliver goods unless cash payment was processed. As a result, Company C was not satisfied with the suppliers, and the relationships between them became purely transactional.

Owing to the fact that suppliers had a low level of commitment, Company C adopted sharp, clear principles. Once the contract with meticulously designed terms was signed, no matter how the prices of raw materials fluctuated, suppliers had to take full responsibility and fulfil their commitment. Nothing could be negotiated. Otherwise, suppliers could make various excuses to delay or decline the supply and ask Company C to find other suppliers.

4.3.4.3 Power Asymmetry

Being a focal manufacturing firm, Company C had more power than its suppliers (see Table 4.15). The significant coercive power used by Company C could be seen from its price-cutting practices, information sharing attitudes and order fulfilment policies.

Table 4.15 Summary of SC Partnering Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SC Partnering</strong></td>
<td>Anticipating building up partner relationship with customers.</td>
<td>Adversarial relationship.</td>
</tr>
<tr>
<td>Supplier Development</td>
<td>Customers required Company C to comply with various standards.</td>
<td>Indirect supplier development.</td>
</tr>
<tr>
<td>Mutual Trust</td>
<td>Contractual trust on quality and performance.</td>
<td>Low level of trust.</td>
</tr>
<tr>
<td>Power Asymmetry</td>
<td>Coercive power was used by customers for price cutting.</td>
<td>Coercive power was passed to suppliers.</td>
</tr>
</tbody>
</table>
4.3.5 Process Integration

The internal processes of Company C had to be significantly integrated and streamlined to improve efficiency (see Table 4.16). During the past couple of years, when many new products were launched simultaneously, the problem of poor internal collaboration became apparent. The peak season would drive a hectic pace at Company C when all customers wanted to catch up with the new season and launch new products simultaneously. The Vice President described the situation as below:

“A few years ago, we launched a few high-end products which were the best even in the whole industry. While the production was completed and the delivery was about to arranged, the customer required to make changes to the products. It really made us hectic. If only a few new models, we were able to handle the situation. If a dozen of new models were involved, we would be in trouble. B-2-1

4.3.5.1 No Just-In-Time Initiative

The Purchasing Manager believed that JIT was inappropriate for Company C, since most of their production was in small batches and had to comply with various specifications (see Table 4.16). Company C required suppliers to deliver component parts one day prior to mass production.

4.3.5.2 Improving Lean Manufacturing

A lean approach had been adopted by Company C for more than five years (see Table 4.16). The best consultant company in China was employed to provide on-site supervision. Most improvements concentrated on cost reduction, lead time shortening, and quality and efficiency enhancement. Continuous effort had been made and more than 300 improvements had been achieved since then. Lead time was shortened through the change of processes, structures and materials. As a result, efficiency was improved considerately and the profit increased by 3 to 4 per cent in 2013.

The efficiency of the production of some products cannot be improved by changing processes only, but would require the modification of the structure as well. This kind of situation was encountered by Company C. If order quantity was 5000pcs, they were able to manage to complete it. If order quantity increased to 50000pcs, production
capacity would not be able to match the demand. After a detailed analysis, Company C realized that the design of the product structure was too complicated, and the processes involved, such as welding and grinding, had to be simplified or changed.

The production mode of Company C was unsuitable for lean operation, which requires even production with infrequent setup so that high efficiency could be achieved. If only a few products were to be produced, the production lines would be stable and improved easily. However, the production of Company C was uneven and the items to be produced were switched frequently. Consequently, it was hard for Company C to achieve a higher level of lean operation.

In comparison with the international leading manufacturers, Company C recognized that there was a big scope for them to improve lean operation capability. As the Vice President pointed out:

"I visited many foreign invested manufacturing firms to learn from their lean operation. It can be seen clearly that lots of waste exists in production processes of CMFs. If only the layout of those firms were to be improved, enormous costs could be saved already. We need to make significant improvement not only on processes, but also layout and many other aspects." B-2-3

4.3.5.3 Early Sales and Operation Planning Process

The S&OP process of Company C was at a very early stage (see Table 4.16). It was limited to major international customers sharing forecasts with Company C only. These international customers shared accurate forecasts with Company C for the next three months or half year. The differences between the forecast and the actual order quantity was about 10 per cent, based on which Company C could make plans for production capacity. The Vice President of Company C thought that the rolling forecasts from customers was critical for the exporting business and if that kind of information could be shared with suppliers, more successful collaboration and higher efficiency could be achieved. As he put it:

"It would be really convenient that we operate like one of our customer’s plants while suppliers operate like one of our plants, uploading all information of production, inventory and delivery on the Web-based
platform. With tight labour supply and high labour costs, providing future forecasts is particularly important for us to balance capacity, human resource and production.” B-2-1

Although Company C had an annual sales plan, it did not provide accurate figures to its suppliers, who could only refer to historical data to predict possible increases of order quantity.

4.3.5.4 Distribution Process

Company C paid limited attention to distribution cost, and the whole distribution process was not properly designed (see Table 4.16). The company mainly employed 3PLs for transportation of goods from warehouse to ports. However, the significant impact of logistics on overall cost had been recognized.

Table 4.16 Summary of Process Integration Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Integration</td>
<td>Significant process integration is essential.</td>
<td></td>
</tr>
<tr>
<td>JIT</td>
<td>JIT was inappropriate since the production was in many small batches and the products had to comply with different specifications.</td>
<td></td>
</tr>
<tr>
<td>Lean Manufacturing</td>
<td>Lean manufacturing had been implemented to realize cost reduction, lead time shortening, and quality and efficiency enhancement.</td>
<td></td>
</tr>
<tr>
<td>Distribution Process</td>
<td>Distribution process was not properly designed.</td>
<td></td>
</tr>
<tr>
<td>S&amp;OP Process</td>
<td>S&amp;OP process was at very early stage.</td>
<td></td>
</tr>
</tbody>
</table>

The warehouse of Company C was managed in a traditional way. Company C stocked finished goods in the warehouse for four to seven days, which was largely determined by shipping schedules. Sometimes, the production of a few small orders was combined for production efficiency, but the finished goods could stay in the warehouse for more than ten days or even one month. The inventory of big components was usually held for two days. Small and cheap parts stayed in the warehouse for four to five days. Goods were piled up in the way to facilitate first-in-first-out movement. Idle inventory was examined in a fixed period. The distribution and warehouse management approach of Company C needed to be largely upgraded.
4.3.6 Collaborative Synchronization

Collaborative synchronization was not observed.

4.3.6.1 SC Visibility

The concept of SC visibility was unknown for senior managers of Company C.

4.3.6.2 No Synergistic Planning and Forecasting

Synergistic planning and forecasting was not observed at Company C.

4.3.6.3 No Inventory Optimization

The concept of IO was unknown to senior managers of Company C.

4.3.6.4 Collaborative Innovation

The importance of collaborative innovation was acknowledged by Company C (see Table 4.17). It worked closely with SC partners on product innovation. Continuous improvement had been made to both existing and new products. Both customers and suppliers were consulted for evaluation or suggestions. If a new product was to be launched, Company C would inform customers first, owing to the fact that customers had a better understanding about the demand in their markets. R&D staff also went overseas together with sales associates to learn cutting-edge technology and design from the international customers.

Table 4.17 Summary of Collaborative Synchronization Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative Synchronization</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>SC Visibility</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>SPF</td>
<td>Not observed</td>
<td></td>
</tr>
<tr>
<td>IO</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Collaborative Innovation</td>
<td>Customers were consulted for evaluation or suggestions.</td>
<td>Suppliers were involved in the NPD processes.</td>
</tr>
</tbody>
</table>

Suppliers were also involved in the NPD processes. They were invited to Company C to offer recommendations for the improvement of design and structure, cost reduction
and higher performance. Both Company C and suppliers paid great attention to this kind of interaction and cooperation.

4.3.7 Barriers to SCC

Multiple barriers to SCC were revealed by the managers of Company C. All interviewed middle-level managers had no idea about the concept of SCC or the positive linkage between SCC and business success. Although they were moving towards this direction as a result of the strong promotions made by consultancy companies, the importance of SCC had not been well understood.

Application of SCC was also restrained by the business mode and the characteristics of the product. Since Company C exported its products globally and adopted a make-to-order strategy, it was very hard for the company to forecast sales unless international customers shared their purchasing information in advance. What Company C could do was try its best to meet the demand by producing the exact quantity ordered by the customers.

Unwillingness to share information was another major barrier. In an effort to make self-protection, Company C believed that valuable information should not be shared with SC partners. Otherwise, they might hurt themselves. Manufacturing firms such as Company C taking extreme caution about information security was out of a sense of having no choice. Vicious competition in the domestic market and the lack of effective legal protection were the major reasons. Company C chose to be conservative and did not trust others. As the Purchasing Manager explained:

“The domestic business environment is not as fair as that in those developed countries. Given that an environment for healthy competition is not nurtured by the government and the intellectual property law is not working, fierce competition has worsened the domestic business environment. Under this situation, our boss chooses not to be open. If we don’t protect ourselves, nobody will.” B-3-5

Guanxi played a minor role in the business relationship between Company C and its suppliers. Those suppliers who had Guanxi with the boss only had advantages if all the same supply conditions as those of other suppliers were met. Guanxi was used by some suppliers to open the door for building up business relationships but did not affect
the final sourcing decision of Company C. New suppliers had to be evaluated by three different departments. Price comparison had to be made between three different suppliers. A special team was formed to collect information and conduct price comparison, then work out an information sheet for the top management to make the final decision.

A summary of SCC initiatives of Company B is shown in Table 4.18. A cause-effect analysis of major problems with SCC between Company C and SC partners is displayed in Figure 4.6.
Table 4.18 Summary of SCC Initiatives of Company C

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>International Customer</th>
<th>Tier 1 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOA</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Executive Sponsorship</td>
<td>Conservative</td>
<td></td>
</tr>
<tr>
<td>Information Sharing</td>
<td>Tactical</td>
<td>Very limited</td>
</tr>
<tr>
<td>Information Connectivity</td>
<td>Well connected</td>
<td>Unconnected</td>
</tr>
<tr>
<td>Information Quality</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Willingness to Share</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>SC Partnering</td>
<td>Adversarial collaboration</td>
<td>Transactional</td>
</tr>
<tr>
<td>Incentive Alignment</td>
<td>Limited risk sharing</td>
<td>No risk sharing</td>
</tr>
<tr>
<td>Supplier Development</td>
<td>Indirect</td>
<td>Indirect</td>
</tr>
<tr>
<td>Mutual Trust</td>
<td>Low</td>
<td>Very Low</td>
</tr>
<tr>
<td>Power Asymmetry</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Process Integration</td>
<td>Require further integration</td>
<td></td>
</tr>
<tr>
<td>JIT</td>
<td>Unsuitable</td>
<td></td>
</tr>
<tr>
<td>Lean</td>
<td>Require continuous effort</td>
<td></td>
</tr>
<tr>
<td>Distribution Process</td>
<td>Not designed</td>
<td></td>
</tr>
<tr>
<td>S&amp;OP Process</td>
<td>Lack of capability</td>
<td></td>
</tr>
<tr>
<td>Collaborative Synchronization</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>SC Visibility</td>
<td>Lack of knowledge</td>
<td></td>
</tr>
<tr>
<td>Synchronized DP</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>IO</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>VMI</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>Collaborative Innovation</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Major Barriers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Lack of inter-organizational information systems.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Lack of awareness of SCC.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Application of SCC was restrained by the business mode and the characteristics of products.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Unwillingness to share information.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Lack of intellectual property protection.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Lack of legal regulation of vicious competition.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Those suppliers who had Guanxi with the boss only had advantages if all conditions were met.</td>
<td></td>
</tr>
</tbody>
</table>
Figure 4.6
Cause-effect analysis of major problems with SCC between Company C & SC partners
4.4 Case D

4.4.1 Overview

Company D is a well-known manufacturer specializing in the production of PCB in China. Their products are supplied to domestic leading E & E manufacturing corporations. This company is a Tier 1 supplier that collaborates with domestic manufacturers and upstream sub-tier suppliers. The position of Company D in the SC can be illustrated as in Figure 4.7.

Figure 4.7 The Supply Chain Position of Company D

4.4.2 Supply Chain Objective Alignment

There was no SCOA between Company D and its SC partners.

4.4.2.1 Executive Sponsorship

The top management of Company D had no idea about the concept of SCC (see Table 4.19). Upon understanding of what SCC was, the boss was concerned that, even if his company preferred to collaborate with SC partners, there was no guarantee that all SC partners would truly want to collaborate as well. However, he believed that it was a viable way to collaborate with SC partners to compete with rivals.

4.4.2.2 Incentive Alignment

There was no incentive alignment between Company D and its SC partners (see Table 4.21). Customers rarely cared about Company D’s interests. All that Company D could do was try its best to meet customers’ requirements. Company D discontinued business with one of the leading customers because of their unreasonable requests. While the
labour cost boosted and the price of raw material hiked, not only did the customer ignore those increased costs, but it also forced Company D lower a few per cent of price every three months. As a result, Company D had no choice but to cheat on raw materials. As the CEO put it:

“Customers only care about their own interests. The reason why our business still can survive is that we satisfy all unreasonable requirements raised by customers; up to a certain point when no profit can be made at all, we will not care about this kind of unreasonable customer anymore.” C-3-1

On the other hand, the business relationship between Company D and another customer was stable. This was because this customer put great effort into NPD, and therefore a better margin was assured.

Table 4.19 Summary of SCOA Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Domestic Customer</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOA</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>Executive Sponsorship</td>
<td>The top management were unaware of the concept of SCC.</td>
<td></td>
</tr>
<tr>
<td>Incentive Alignment</td>
<td>Customers forced Company D to bear all costs and risks.</td>
<td>Company D tried to reduce suppliers’ losses.</td>
</tr>
</tbody>
</table>

4.4.3 Information Sharing

There were an increased number of customers setting up Web-based platforms to share information with Company D (see Table 4.20). At the same time, they required Company D to upload order-related information to their platforms. Company D sent employees to stay near the customers’ plants, providing immediate service. Suppliers also allocated staff to stay near Company D to provide support. However, very limited information was shared with suppliers.

4.4.3.1 Information Connectivity

Very limited investment was made in information systems by Company D (see Table 4.20). Telephone communication was the main approach to sharing inventory information with suppliers. ERP was the only information system available for production management; but it was incomplete and had many problems. A large amount of manual work was required for verifying the accuracy of the information of
finished goods. In addition, some detailed information cannot be displayed. For example, if the quantity of the goods received was 1000 pcs in total, only the aggregate quantity can be displayed. More detailed information, such as the number of boxes and the date of production, cannot be displayed. The packaging requirement varied according to different customers. Some customers needed 6 pcs PCB for each whole board, while other customers needed 1pc PCB. It was acceptable to some customers that one of the six pieces PCB was defective, while other customers might accept two. All that information had to be displayed on the carton, which demanded large amount of manual work.

With an escalating purchasing quantity, Company D was trying to build a purchasing platform so that e-auction could be adopted to drastically cut purchasing costs. The Purchasing Manager stated that an increased amount of investment had to be made for a better information system:

“Our company develops very fast. The existing purchasing strategies and approaches cannot match the scale of operation. The information system needs to be improved for more effective purchasing and customer relationship management. E-auction should be applied to cut purchasing costs.” C-5-5

4.4.3.2 Information Quality

The quality of information was very low (see Table 4.20). Much time was spent in counting the stock to see if they matched with the data entered into the ERP system.

4.4.3.3 Willingness to Share

There was no need for Company D to share inventory information with customers (see Table 4.20). As it was a buyer’s market, customers only asked if the goods for a new order could be prepared within the next three days. If Company D was unable to meet the demand, customers would just switch the order to other suppliers. In other words, customers had many sources of supply and did not care about sharing inventory information with Company D at all.
### Table 4.20 Summary of Information Sharing Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Domestic Customer</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Sharing</td>
<td>No need to know information.</td>
<td>Limited operational information sharing.</td>
</tr>
<tr>
<td>Information Connectivity</td>
<td>Communicate through customers’ online platform.</td>
<td>No information system was available.</td>
</tr>
<tr>
<td>Information Quality</td>
<td>Very low information quality.</td>
<td>Very low information quality.</td>
</tr>
<tr>
<td>Willingness to Share</td>
<td>Unwilling to share information.</td>
<td>Without information shared by customers, it was impossible to share information with suppliers.</td>
</tr>
</tbody>
</table>

#### 4.4.4 SC Partnering

There was no strategic relationship between Company D and its SC partners (see Table 4.21). Due to the fact that existing technology to manufacture PCB products was very mature, a large number of high quality PCB manufacturing firms were available for a few big customers to choose. Customers usually had at least three suppliers for PCB, and never needed to worry about the source supply. If they wanted to develop a new product, their R&D departments would communicate with Company D’s supplier first before informing Company D. Company D was in the middle of the link and their responsibility was confined to manufacturing. All that Company D needed to do was to add a wiring diagram onto the board; and this wiring diagram was designed by customers and relied on the performance of the board. Therefore, Company D did not own core technology and could be replaced anytime. However, it was impossible for Company D to switch their suppliers since they were appointed by the customers. Subsequently, it was very hard for Company D coordinate the relationship. Since this type of supplier provided nearly 60 per cent of Company D’s purchasing, a close relationship with them had to be built by visiting them more frequently. Usually, the CEO communicated with them in person.

#### 4.4.4.1 Supplier Development

Most of the PCBs produced by Company D were ultimately supplied to Fortune 500 companies, although they were first purchased by the focal manufacturing firms in China and then assembled inside the E & E products (see Table 4.21). Usually, these customers provided training to Company D to meet their standards. Similarly, some
domestic customers offered assistance to Company D to improve the quality of their products.

Some of the raw material and facility suppliers were leaders of the industry. They accounted for 80 per cent of the purchasing amount of Company D. The manufacturing capability of Company D was far behind this type of supplier therefore their supervision is important for Company D to make improvement. Very strong supervision team were formed by those suppliers to provide training to Company D in how to maintain the best working condition of their facilities, make best use of those facilities, and set the best parameters for operation. Company D followed those suppliers’ advice and leveraged their expertise to enhance its own capability.

Realizing the importance of the development of suppliers’ capabilities to their own products, Company D sent technological staff to assist those suppliers who were weak in technology, and invited them to participate in all training courses. If any problems occurred with suppliers in production, Company D would provide all necessary help. If the problems could not be resolved within the limited time scope, Company D had to substitute the supplier because it could not afford to halt its own production while waiting for the supplier to fix the problem. If any problem happened to the production of critical raw materials and the supplier could not find a solution within 24 hours, a new supplier would take over immediately.

While the production capacity increased considerably, Company D shifted from small suppliers to big ones. They provided assistance and support for existing suppliers to upgrade their capacity to match the expanded demand. Feedback on suppliers’ products were offered to them to make improvements. However, some suppliers were comfortable with their current scale and were concerned about the risks associated with further expansion. As a result, Company D had to replace those suppliers.

**4.4.4.2 Low Mutual Trust**

The level of trust between Company D and its SC partners was very low (see Table 4.21). The CEO believed that it would be very hard to collaborate with the entire SC since all parties in the SC had to bear the same thinking and goals in mind and move towards the same direction. Nevertheless, the CEO believed that, with escalating competition, the loyalty of suppliers had grown steadily and the willingness to cooperate
intensified.

In order to ensure the quality of the products, the customers of Company D appointed Tier 2 suppliers when they were developing new products. All those suppliers were foreign-invested companies leading the industry. When asked why Company D did not source from Chinese suppliers, the Purchasing Manager explained:

“The Chinese suppliers are very smart and able to produce everything. However, it is very hard to ensure consistency in quality. If we lower the purchasing price, they will use materials of lower grade to maintain profit margin. Even if we maintain the same purchasing price, it is still very possible that they try to cheat on processes and materials in order to obtain a higher profit.” C-5-6

Apparently, the commitment of Chinese suppliers was very low. Consequently, the level of trust in those suppliers was extremely low as well.

4.4.4.3 Power Asymmetry

Power asymmetry was prominent between Company D and its SC partners (see Table 4.21). Owing to the fact that the PCB industry was very mature and plenty of alternative sources of supply were available, the focal E & E manufacturing firms rarely cared about suppliers’ interests. They placed new orders without any consideration of suppliers’ production plan, and simply demanded the delivery of goods in a very short lead time. If suppliers were unable to finish the production on time, they switched the order to other suppliers without hesitation. Although the customer would take those goods later, Company D had to keep the inventory until next month. Under this situation, it was very hard for Company D to manage production capacity and smooth production flow for higher efficiency and lower cost.

The extreme situation is that one of the leading focal manufacturing firms demanded Company D to make price reduction every month. Worse still, no negotiation was allowed. After the goods were delivered to the customer’s warehouse, no payment was processed until the goods were actually used. If those goods were never to be used, the customer would only pay for the cost of the goods. As a result, the business with this customer was terminated. As the General Manager contended:
“This is a typical example of bullying and is not sustainable. This kind of customers treat every supplier in this way and will be in trouble one day. Customers take advantage of the power they have and only care for their own benefits.” C-3-1

### Table 4.21 Summary of SC Partnering Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Domestic Customer</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC Partnering</td>
<td>Adversarial relationship</td>
<td>Adversarial relationship</td>
</tr>
<tr>
<td>Supplier Development</td>
<td>Some offered assistance to improve the quality of products.</td>
<td>Company D took leading suppliers’ expertise to enhance own capability.</td>
</tr>
<tr>
<td>Mutual Trust</td>
<td>Very low level of trust.</td>
<td>Very low level of trust.</td>
</tr>
<tr>
<td>Power Asymmetry</td>
<td>Coercive power was abused by customers.</td>
<td>Coercive power was passed to suppliers.</td>
</tr>
</tbody>
</table>

#### 4.4.5 Process Integration

While some leading customers started to put less emphasis on cost reduction and pay more attention to the stability of product quality and on-time delivery, streamlining of production process became more important (see Table 4.22). Accordingly, Company D had adjusted the purchasing strategies by putting more weight on quality. The target of Company D was to make every piece of PCB up to standard. Hence, it started to focus on integration and rationalization of the production processes to facilitate better utilization of facilities, lower labour costs, and reduction of water and electricity usage. This would result in higher efficiency and less customer complaints.

##### 4.4.5.1 Providing Just-In-Time Delivery

Company D offered JIT delivery service to customers. This company built own warehouses close to customers’ sites. Products were delivered to customers according to instructions.

##### 4.4.5.2 Low Level of Lean Manufacturing

Lean manufacturing had been adopted by Company D from six years ago (see Table 4.22). Owing to the fact that the function of the PCB board was designed by customers
and could not be changed, all that Company D could do was the simplification of the manufacturing processes so that the cost could be reduced. A special department was set up by Company D to improve the standardization of production processes, realize better utilization of facilities, and maximize production capacity.

The complicated production processes were optimized continuously for higher quality. For example, a new environmentally friendly process was introduced to replace the process of electroless plating copper, for higher efficiency. The activities of each worker were videotaped and examined to remove redundancy. The new introduced materials were evaluated in terms of the level of popularity, improvement with the stability of quality, and enhancement of the performance of the final products. To deal with increasing labour costs, Company D made more investment in automated facilities to improve efficiency and to link up the whole production line.

It was very hard to encourage the participation of workers. The quality control was mainly executed by middle-level managers and technicians who were experts in both management and technology. Workers only cared about how much money they could earn and did not pay attention to quality control. The situation was worst during the Spring Festival, because Company D was lacking in workforce at the end the year and had to recruit lots of new workers after the Spring Festival. As a result, Company D had to separate the operation process into the simplest actions so that new workers could be trained within half an hour. Under this situation, workers could not be relied on for quality control.

4.4.5.3 No Sales and Operation Planning Process

Company D had no S&OP process capability (see Table 4.22). Since most customers did not provide accurate plans, it was almost impossible for Company D to do forecasting and planning for production. The situation is reflected in what the General Manager said:

“The planning capability of the Chinese domestic manufacturing firms is very weak. Although they claim that they have plans, when it comes to suppliers, there is no plan at all. Customers only permit a lead time of less than one week in a buyers’ market. Sometimes, all orders come together; sometimes, we have no order, resulting in big waste and under-utilization
of facilities. Upon dealing with international customers, we started to realize that these customers have reasonable plans, which provides us certain times to make preparation and adjustment for production.” C-3-2

4.4.5.4 Victim of VMI

VMI was widely adopted by Company D’s customers (see Table 4.22). However, Company D believed that they were the victims of VMI because all customers adopted VMI to push inventory and costs to upstream suppliers such as Company D. Some customers requested Company D to deliver goods to their warehouse but did not process the payment until the goods were actually used. As a result, sometimes Company D was not able to receive any payment one year after the goods were dispatched. One extreme situation was that Company D was not allowed to count its own inventory stocked in one customer’s warehouse and was only informed how much of the goods had been used by the customer. As such, Company D suffered from various VMI policies of their customers. As the Sales Manager indicated:

“Suppliers like us need to manage VMI carefully. VMI is absolutely favourable for customers owing to the fact that much lower or even zero inventory is held by customers but more inventory and higher risk is pushed towards suppliers like us. Consequently, our cost increased considerably. The positive aspect is that customers provide better plans for delivery which enable us to reduce the purchasing cost slightly. Frequent communication with customers is crucial for us to check if the existing models have been changed so that we can lower the inventory of that model as much as possible.” C-6-1

The General Manager also added:

“Those customers tried to learn SCM from the Western companies but imitated it partially. Instead of seeking for common interests of the whole SC, they adopted VMI to benefit themselves but disadvantage suppliers. They may obtain short-term benefits but are not wise enough to take long-term benefits into consideration.” C-3-1

4.4.5.5 Distribution Processes

The warehouse of Company D was mainly managed through ERP and manual
verification (see Table 4.22). All data entered into the ERP system had to be checked manually to ensure the accuracy of information. The ERP system needed to be improved substantially, since much detailed information was not able to be recorded and displayed.

The inventory level of finished goods was very high. The general requirement for inventory management was to keep inventory in the warehouse for no longer than a month. According to the different requirements of different customers, some PCBs moved in and out on the same day while some stayed in the warehouse for one month if the goods were for big orders and had to be delivered until the whole order was finished.

Company D had to hold some inventory of raw materials because the industry was somewhat monopolised or semi-monopolised by a few leading suppliers. To take the base plate as an example, 60 per cent of market share was monopolised by one supplier, who was powerful enough to set the market price by itself. While customers of Company D appointed this raw material supplier because of the best quality and large production capacity, Company D had no choice but to hold inventory for this type of raw material. As the Purchasing Manager explained:

“We may hold enough inventory of this raw material to ensure the normal production of the next three months. We also do some simple forecasting based on the pattern of historical price fluctuations. For example, normally, May to July belongs to off-peak season and the price is the lowest. Two months later, the price would rise sharply. Therefore, we purchase around 10 million RMB of raw materials during the off-peak season and store them in the warehouse.” C-5-3

In an effort to avoid shortage of raw materials, sometimes Company D had to reserve some raw materials for customers if the possibility of winning the order was high. Customers only assisted them to digest a small portion of the inventory if it turned out that Company D failed to win the order. The inventory of those raw materials was accumulated for more than three months to three years.
<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Domestic Customer</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process Integration</strong></td>
<td>Processes need to be streamlined and integrated for better quality.</td>
<td></td>
</tr>
<tr>
<td>JIT</td>
<td>Provided JIT delivery for focal manufacturing firms.</td>
<td>N/A</td>
</tr>
<tr>
<td>Lean Manufacturing</td>
<td>All that Company D could do was confined to the simplification of the manufacturing process.</td>
<td></td>
</tr>
<tr>
<td>S&amp;OP Process</td>
<td>Impossible to do forecast and planning.</td>
<td></td>
</tr>
<tr>
<td>VMI</td>
<td>Victim of partially imitated VMI practices of customers.</td>
<td>Limited to metal products</td>
</tr>
<tr>
<td>Distribution Process</td>
<td>Very high level of inventory was held in warehouse.</td>
<td></td>
</tr>
</tbody>
</table>

### 4.4.6 Collaborative Synchronization

Collaborative synchronization between Company D and its SC partners was not observed.

#### 4.4.6.1 SC Visibility

Without information systems, SC visibility could not be realized.

#### 4.4.6.2 No Synergistic Planning and Forecasting

Synergistic planning and forecasting was not observed.

#### 4.4.6.3 No Inventory Optimization

The concept of IO was unknown for senior managers of Company D.

#### 4.4.6.4 Collaborative Innovation

Since the design of PCB was tailored for customers' products, Company D usually tried to communicate with customers and engaged in their design activities, making some suggestions to the design so that the manufacturing processes of Company D were able to be simplified for lower costs (see Table 4.23). Most of the changes were made because the design was too complicated and the wire could be circulated in a different way. This could make the manufacturing of the PCB much less complicated.
4.4.7 Barriers to SCC

SCC was a new concept for all senior managers of Company D. It would take some time for the company to get familiar with the notion and acknowledge the importance of it. In order to reap more benefit, the focal manufacturing firms tended to transplant

Table 4.23 Summary of Collaborative Synchronization

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Domestic Customer</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative Synchronization</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>SC Visibility</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>SPF</td>
<td>Not observed.</td>
<td>Not observed.</td>
</tr>
<tr>
<td>IO</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>Collaborative Innovation</td>
<td>Engaged in customers’ design activities for simplification of manufacturing processes.</td>
<td>Suppliers involved.</td>
</tr>
</tbody>
</table>

SCM initiatives that have emerged in Western developed countries without deep consideration of the institutional environment. Even worse, they inclined to take a wrong perspective on the SCM paradigm, which might inhibit the achievement of common goals. Trust was a major hurdle to the adoption of SCC. Since the interests of multiple parties were involved, it was very hard for them to trust each other and work towards the same goal. As with other companies investigated, Guanxi was revealed to be unimportant for SCC in this case.

A summary of SCC initiatives of Company D is shown in Table 4.24. A cause-effect analysis of major problems with SCC between Company D and its SC partners is displayed in Figure 4.8.

4.5 Chapter Summary

This chapter has focused on the within-case analysis of the collaborative initiatives of the four manufacturing firms with their SC partners. Using the same template, the various key elements of SCC and the major barriers encountered by the case companies were systematically presented. The next chapter will provide a cross-case analysis of SCC for the four manufacturing firms.
### Table 4.24 Summary of SCC Initiative of Company D

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Domestic Customer</th>
<th>Tier 2 Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOA</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Executive Sponsorship</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Information Sharing</td>
<td>Very limited</td>
<td>Very limited</td>
</tr>
<tr>
<td>Information Connectivity</td>
<td>Unconnected</td>
<td>Unconnected</td>
</tr>
<tr>
<td>Information Quality</td>
<td>Very low</td>
<td>Very Low</td>
</tr>
<tr>
<td>Willingness to Share</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>SC Partnering</td>
<td>Adversarial relationship</td>
<td>Adversarial relationship</td>
</tr>
<tr>
<td>Incentive Alignment</td>
<td>Push risks and cost</td>
<td>No risk sharing</td>
</tr>
<tr>
<td>Supplier Development</td>
<td>Indirect</td>
<td>Indirect</td>
</tr>
<tr>
<td>Mutual Trust</td>
<td>Very low</td>
<td>Very Low</td>
</tr>
<tr>
<td>Power Asymmetry</td>
<td>Coercive power</td>
<td>Coercive power</td>
</tr>
<tr>
<td>Process Integration</td>
<td>Require further integration</td>
<td></td>
</tr>
<tr>
<td>JIT</td>
<td>JIT delivery</td>
<td></td>
</tr>
<tr>
<td>Lean</td>
<td>Need further improvement</td>
<td></td>
</tr>
<tr>
<td>Distribution Process</td>
<td>Not designed</td>
<td></td>
</tr>
<tr>
<td>S&amp;OP Process</td>
<td>Lack of knowledge</td>
<td></td>
</tr>
<tr>
<td>Collaborative Synchronization</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>SC Visibility</td>
<td>Not observed</td>
<td></td>
</tr>
<tr>
<td>Synchronized DP</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>IO</td>
<td>Not observed</td>
<td>Not observed</td>
</tr>
<tr>
<td>VMI</td>
<td>Partial imitation</td>
<td>Not observed</td>
</tr>
<tr>
<td>Collaborative Innovation</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

- Lack of inter-organizational information system.
- Lack of awareness about SCC.
- Partial imitation of SCC practices of focal manufacturing firms for maximization of own interests.
- Abuse of coercive power.
- Lack of trust.
- Inconsistency of government policies.
- Most suppliers have no intention to improve SCC capabilities because they lack of confidence.
- Guanxi was revealed to be non-critical to building up strategic relationships.
Figure 4.8
Cause-effect analysis of major problems with SCC between Company D & SC partners

3. Adversarial SC Relationship
   - Burden with all cost and risk
     - Customers are lack of SCC vision
     - Customers’ partial imitation of SCC practices
   - Incentive misalignment
     - Customers’ maximization of own interests
     - Customers abuse power
   - The influence of Chinese culture
     - Lack of mutual trust
       - Lack of legal protection

2. Weak Information Sharing
   - Invest for cost reduction only
     - Lack of Information systems
     - Incomplete information system
   - Vicious competition
     - Lack of legal protection
     - No objective alignment between SC partners
   - Adversarial SC relationship
     - Unwilling to share information
       - Lack of legal protection
   - Power Asymmetry

1. SC Objective Misalignment
   - Lack of SCC awareness
   - Lack of SCC awareness
   - No executive sponsorship
   - Unstable macroeconomic policies
   - Lack of confidence with the manufacturing industry
   - Power Asymmetry

5. Low Synchronization Capabilities
   - Unsynchronized forecast and planning
     - Transnational SC relationship
       - Lack of organizational capability
         - Customers’ maximization of local interests
         - Customers’ partial imitation of VMI practices
   - Inefficient VMI operation
     - Customers abuse power
   - Lack of forecast tools and planning solutions
     - Lack of SCM knowledge

4. Low Process Capabilities
   - Low level of lean manufacturing
     - Undereducated workers
     - Unreasonable layout
   - Scattered distribution process
     - Impossible to forecast
     - No S&OP process
     - Customers demand extremely short lead time
   - Lack of SCM knowledge
A within-case analysis was presented in the preceding chapter. In this chapter, a cross-case comparison is made to complement the insights of the within-case analysis by identifying common themes in the data.

5.1 Cross-Case Analysis

The four cases revealed that SCC was being adopted by only a small portion of leading manufacturing firms in China. Both Companies A and B took the lead within their respective lines in this aspect. The level of collaboration between Company A and its SC partners was the highest among the four firms under investigation. SC objectives were aligned, a large amount of information was shared, and a partner relationship was formed, SC processes were somewhat integrated, and weekly forecasts and planning were shared with its SC partners. Company B was at the early stage of SCC and relatively unsophisticated, owing to the fact that information isolation islands were prominent, partner relationships needed to be nurtured, and operation processes required substantial integration.

In contrast, SCC was not acknowledged by Companies C and D. Although internal information sharing was realized and lean operation was employed by Company C, all senior managers had no idea about SCC. The business was managed in a very traditional way, by focusing on cost minimization and maintaining arm’s-length relationships with business partners. All managers of Company D were unaware of SCC, although many of their customers had adopted this approach. Very limited collaborative operations, such as JIT delivery and VMI, were observed. The relationships between Company D and its SC partners were mainly adversarial.

5.1.1 SC Objective Alignment

Common SC objectives were not widely established by manufacturers to guide and encourage cooperation with SC partners (see Table 5.1). As the cases revealed, only Companies A and B set congruent goals with their strategic SC partners. Company A
signed detailed agreements specifying business goals, including annual sales, annual aggregated order quantity, and the percentage of cost reduction, with both upstream and downstream strategic SC partners. All strategic SC members spent great efforts to achieve those goals so that mutual interests could be realized. In comparison, the common goals set by Company B and its SC partners were much less specific and mainly focused on annual sales. Moreover, the establishment of common goals between Company B and its SC partners was more formalistic. Instead of being built to prevent opportunistic behaviour and promote collaboration, common goals became a burden for suppliers, who were obliged to sign the agreement simply for maintaining their business share. They were being speculative and exhibited very low commitment afterwards. Strictly speaking, the common goal between Company B and SC partners was just an annual sales target. Hence, Company A was the only one that had established real common objectives with its strategic SC partners.

5.1.1.1 Executive Sponsorship

The involvement of executive sponsorship is essential to the successful implementation of SCC initiatives (see Table 5.1). In the four companies investigated, SCC was relatively more successfully applied by Company A. It was largely determined by the recognition of the CEO, who championed various SCM initiatives himself. He was also passionate about learning the most advanced management skills and technologies from the world-class international business partners. In the case of Company B, the senior management team had a clear SCC vision and made detailed plans for the implementation of SCC in the next five to ten years. The CEO was open-minded to the best SCC practices, although he was suspicious about the possible impact of SCC on business performance.

By contrast, the CEO of Company C held a much more conservative attitude towards SCC. The CEO was especially sensitive about sharing information, as many of his former employees learned from the company and then left and became its competitors. In order to prevent the leaking of information to competitors, Company C set very strict rules about taking electronic storage devices out of the company by its staff. In an effort to foil possible low commitment of its suppliers, Company C also laid down hard policies to ensure suppliers would fulfil signed contracts, and forbade any risk and cost sharing. Consequently, collaboration between Company C and its SC partners was very limited.
Similarly, the CEO of Company D had never heard of SCC and doubted deeply if SC partners would truly want to collaborate. Table 5.1 summarizes the cross-case comparison in this aspect.

5.1.1.2 Incentive Alignment

Incentives were often misaligned for local interests at the expense of other parties (see Table 5.3). Instead of formulating policies maximizing the overall SC profits, Company B used large-order discounts to push excess inventory downstream since it had the power advantage to offer discounts and set promotion policies. In order to obtain a higher profit return for a certain annual sale amount or take advantage of big discounts, franchisees placed large orders and piled up inventory in their warehouses. Although such moves eased Company B’s inventory pressure in its own warehouse, the massive inventory accumulated across the SC created another issue. As information transparency of the entire chain was very low, it was impossible for Company B to work out how much inventory had been stocked. This made it more difficult for Company B to forecast its real demand. A vicious cycle was generated, which might threaten the survival of Company B in the long run.

While manufacturing firms had begun to realize the importance of incentive alignment with SC partners, pushing costs and risks to other parties was common practice, and genuine cost and risk sharing was rare. In the case of Company A, incentives were relatively better aligned with SC partners. However, the VP revealed that, in practice, both international and domestic customers pushed costs and risks to upstream suppliers, and nobody truly wanted to share costs and risks with them. Company B was in a stronger position than both downstream franchisees and upstream suppliers, and was therefore inclined to push costs and risks towards both ends. Company C held a clear position that they would not share any costs and risks with suppliers. Without a firm stance, it was very likely that suppliers might behave opportunistically and seek excuses to shift responsibility back to Company C. As a Tier 1 supplier, Company D suffered all costs and risks transferred from customers. Apparently, incentive misalignment exists extensively in the manufacturing industry in China.
Table 5.1 Cross-case Comparison of SCOA Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
<th>Company D</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCOA</td>
<td>Part</td>
<td>Part</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Executive Sponsorship</td>
<td>Championed various SCM initiatives.</td>
<td>Open-minded and supportive.</td>
<td>Conservative attitude towards SCC.</td>
<td>Unaware of SCC.</td>
</tr>
<tr>
<td>Incentive Alignment</td>
<td>Costs and risks were shared with leading international customers.</td>
<td>Began cost and risk sharing to encourage close cooperation.</td>
<td>No cost and risk sharing.</td>
<td>Burdened with all costs and risks.</td>
</tr>
</tbody>
</table>

5.1.2 Information Sharing

Information sharing capabilities of the four manufacturing firms were largely constrained by the unavailability of IOS and the unwillingness to share information (see Table 5.2). The problem of information sharing was prominent in Companies B, C and D. Information was not shared internally between different functions in Company B. A few information systems were built for various purposes, but not integrated. The isolated information islands prohibited information sharing throughout the organization. In the meantime, information was not disseminated externally as well. Valuable information such as point-of-sales data could not be shared in a timely and accurate manner.

In comparison, the information system of Company C was better internally integrated. Total information was shared across the company through its SAP system. A few subsidiary systems were also built to enable better internal operations. With its CRM system, communication and information sharing with international customers was also fluent. Order or product information was uploaded to customers’ Web-based platform as requested. However, external information sharing with suppliers was significantly less than desirable. Currently, communication with suppliers was mainly through fax, telephone and email. The purchasing department was the only contact point authorized to interact with suppliers. There was no plan for setting up a SRM system to enhance information sharing with suppliers.

In comparison to Companies B and C, the information system of Company D was even less developed. An ERP was the only information system used by the company. It was incomplete, so that lots of information could not be entered and displayed. Moreover, much manual verification was required to ensure the accuracy of information in the
Therefore, a considerable amount of investment had to be made to improve the information system of Company D.

Unwillingness to share information with SC partners was commonly found in Companies B, C and D. While rolling forecasts, plans and operational data of JIT delivery were shared with suppliers, Company B tried to retain as much information as possible from its business partners. Instead of sharing information with its SC partners, the IT department of this company managed to let its SC partners share more information.

Information sharing with franchisees had become a major challenge, and would even threaten the survival of Company B in the near future. Franchisees were unwilling to share information with Company B, in an effort to protect their interests. If the real sales information were reported to Company B, the franchisees might lose profit based on their actual lower total sales. As a result, Company B had no idea how many items were actually sold to consumers and how many were still lying in the franchisee’s warehouse. While Company B kept pushing more inventory to different levels of franchisees by offering discounts or rebates, it would be dangerous when inventory throughout the channel was accumulating without being acknowledged. At the other end of the SC, suppliers were also reluctant to share information with Company B. They intended to hide important information if major problems were encountered that might lead to penalties. As such, building up CRM and SRM information systems and improving SC visibility were the most urgent issues for this company.

Similarly, Company C was also disinclined to share information with suppliers. Fearing the development of potential competitors, Company C set strict rules regarding information sharing and order fulfilment. Suppliers were required to adhere closely to the contracts signed between both parties. As with the IT manager in Company B, the purchasing manager of Company C also had a preference for suppliers to share more information.

The situation of information sharing in Company D was even more extreme. As a Tier 1 supplier, the IT manager rationalized that customers did not need their information at all, since what they did was just to place an order with a lead time of three to five days. If Company D could not meet the required deadline, they just redirected the order to
other backup suppliers. The IT manager also stressed the sharing of as less information as possible with the suppliers. Table 5.2 summarizes the cross-case comparison in this regard.

Table 5.2 Cross-case Comparison of Information Sharing Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
<th>Company D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Sharing</td>
<td>Tactical information was shared internally and externally.</td>
<td>Significant problem with internal information sharing and tactical information sharing with suppliers.</td>
<td>Tactical information sharing with customers but very limited information sharing with suppliers.</td>
<td>Operational information sharing with customers.</td>
</tr>
<tr>
<td>Information Connectivity</td>
<td>Number of information systems were employed.</td>
<td>SAP system is implemented but not mature enough to facilitate both internal and external integration.</td>
<td>SAP system was implemented to enable internal information sharing.</td>
<td>ERP system was the only information system available but incomplete.</td>
</tr>
<tr>
<td>Willingness to Share Information</td>
<td>Shared wide variety of information</td>
<td>Shared as less information as they could.</td>
<td>Unwilling to share information</td>
<td>Unwilling to share information</td>
</tr>
</tbody>
</table>

5.1.3 SC Partnering

Discrete arm’s length relationships were dominant in all companies under investigation (see Table 5.3). While collaborative partnerships were developed with a few strategic customers and suppliers, relationships between Company A and most of its SC partners were adversarial in nature. The Vice President revealed that, although the relationship was still labelled as partnership, it was essentially transactional. In other words, there was a trend of superficial partnerships with SC partners.

Taking domestic customers as an example, some of them always tried to incorporate suppliers’ businesses into their own. Originally, they specialized in production of E & E products while their suppliers specialized in component parts. However, they started to produce motors or other component parts by themselves to save purchasing cost or for other purposes. Under such a situation, it was very difficult to form a collaborative relationship between two parties given that the customers became the competitors of their suppliers. Moreover, domestic customers managed to push all costs and risks to upstream suppliers such as Company A. As such, it can be argued that the relationships between Company A and the majority of its SC partners were transactional.

The relationships between Company B and its franchisees were gaming relationships. In an effort to achieve more sales or push more inventory to downstream sales
terminals, Company B tried to develop various promotional policies to encourage franchisees to make more purchases. On the other hand, multiple levels of franchisees sought earnestly to take advantage of those policies for their own benefit. Therefore, more than one manager of Company B mentioned that franchisees were cunning, and that therefore it was better to let them have as less information as possible.

Currently, relationships between Company B and its strategic suppliers were turning from the traditional transactional towards a superficial type of partnership. Realizing the vital importance of suppliers to its own success, Company B started to nurture strategic partner relationships with its suppliers. While both parties negotiated for their own benefits, Company B shared part of the costs with suppliers rather than demanding endless price squeezing. The company understood that bullying would be harmful to both parties, resulting in a lose-lose situation.

The relationships between Company C and its suppliers were purely transactional. After Company C won large promotional orders from international customers, its suppliers would bid for those orders. Once the contract was signed, everything was fixed and nothing could be negotiated any more. In contrast to Company B, both as focal manufacturing firms in the same industry, Company C exerted very limited effort in collaborative initiatives, and rarely cared about suppliers. The root cause of this phenomenon could be that Company C kept the production of most component parts in-house, and only outsourced a small portion of non-critical spare parts, meaning that suppliers did not play such an important role as those of Company B. Moreover, it was very hard of the suppliers to maintain continuity of production and achieve economy of scale, since most of the orders of Company C, except for a few big promotional orders, were small in quantity, which involved many different items with different specifications. Therefore, it was almost impossible to induce them to cooperate. Company C would rather focus on bulk purchasing of commodities, which had significant impact on manufacturing cost. Unsurprisingly, instead of starting to pay more attention to suppliers as Company B did, Company C maintained a traditional and adversarial relationship with suppliers.

The relationships between Company D and its SC partners were purely transactional as well. Domestic focal manufacturing firms managed to push all costs and risks to Tier 1 suppliers such as Company D, while Company D could only satisfy all those
unreasonable requests by domestic customers to maintain business. Some of the leading domestic focal manufacturing firms demanded price cutting with no room for negotiation. While Company D was required to provide a VMI service, some customers did not even permit Company D to count its own inventory that was piled up in the customers’ warehouses. This kind of practice is, basically, bullying. Domestic focal manufacturing firms took advantage of their strong positional power to maximize their benefits at the expense of their suppliers. The worst outcome was the ultimate disintegration of business relationships between Company D and this type of customer. Hence, it can be seen that the relationship between Company D and SC partners was price oriented and adversarial.

5.1.3.1 Supplier Development

All four companies realized that the development of suppliers’ capabilities was of great importance to buyers’ competencies in terms of cost reduction, quality improvement, and JIT delivery performance (see Table 5.3). They participated actively in a wide array of supply development activities. Among the four companies investigated, Company A invested the most resources in both direct and indirect supplier development initiatives. It provided equipment, tools and capital to a few strategic suppliers who possessed core technologies. It also attempted to transfer part of its in-house organizational capabilities to core suppliers through hand-on supervision activities, which demanded a huge amount of investment of human resources and time. Engineers were assigned and allocated to suppliers’ sites to assist in quality control and efficiency enhancement. Sometimes, Company A would even request the change of the whole layout of a supplier’s shopfloor. In response, most of the suppliers cooperated with Company A closely in making the improvements without hesitation. However, a few were unwilling to open the door, and regarded the assistance as intervention, out of the fear that customers such as Company A might learn more about their operations and cost structure and thereby use the information they provided opportunistically.

The situation was slightly different in Company B. Instead of directly investing resources, it engaged mainly in indirect supplier development, by adopting incentive mechanisms to prompt suppliers to improve. Company B measured suppliers’ performance every month in terms of quality, cost, on-time delivery, and service. Feedback was returned to suppliers so that they knew the level of their own
performance among all suppliers and the problems with their products. Engineers were sent to suppliers’ sites to help them improve logistics, technology and quality. In the case of an underperforming supplier, Company B took them to other suppliers’ sites to learn better operations, technologies and practices. Company B also instilled competition by splitting contracts among a few suppliers and rewarding the best suppliers with increased business volumes and designating them as preferred vendors.

By contrast, Company C invested much less resources and effort than Company B in indirect supplier development. Company C assessed and ranked suppliers every month. The result of this evaluation was communicated to the suppliers. Improvements were suggested to those suppliers who ranked lowest. The supplier with the poorest performance would be replaced as a result. Similar to Companies A and B, Company C also provided assistance to suppliers to help them with quality improvement, cost reduction, technology transfer, and production efficiency enhancement. If the quality of parts produced by suppliers could not meet the requirements, engineers of Company C were assigned to help suppliers to optimize the design or structure. In addition, Company C attempted to foster more competition within the supplier base by assisting the weakest suppliers. Lastly, in order to match the target cost of spare parts, Company C exerted great efforts to help suppliers reduce production costs.

Company D was involved in indirect supplier development as well, but this effort was much more limited. Technology staff were deployed to suppliers’ sites to solve problems together. Important training was also provided to suppliers to participate. However, if any critical problems occurred at a supplier’s site and could not be resolved within the limited time scope, Company D had to replace the supplier so that its normal production would not be affected. In addition, Company D had some leading suppliers who were very strong in the industry and provided technology assistance to Company D, who could use the knowledge to help other less capable suppliers.

5.1.3.2 Trust and Commitment

The level of trust and commitment between the four manufacturing firms and their SC partners was disappointingly low (see Table 5.3). For example, Companies A, B and C believed that it was dangerous to source from a sole supplier because it was very likely that they might be cheated or threatened by the supplier. As a result, it was very difficult
to rationalize the number of suppliers owing to the fact that companies had to maintain three to four suppliers for each item to ensure adequate competition among the suppliers.

When it came to total cost analysis, both Companies A and B believed that suppliers did not provide them with the true cost of parts. This was because suppliers did not trust buying firms and always hid some costs so that they would not be exploited by the customers later. Companies A and B also agreed that it was common for suppliers to breach agreements signed between the two parties. For instance, Company A signed collaborative agreements with major suppliers to guarantee stable supply of parts at low prices while rewarded the suppliers with big order quantities and other preferential policies. However, the suppliers still breached the signed contracts and supplied to the existing customers’ competitors because they might get higher profits or they did not believe that they were treated preferentially by Company A. A similar situation was also applicable to Company B. In order to maintain the business relationship with Company B, some suppliers had no choice but to sign the collaborative agreement. When some issues or disputes arose at later stage, the suppliers acted opportunistically instead of complying with the signed agreement. While a JIT approach was deployed, both Company A and Company B still had to inspect and scrutinize all items delivered by the suppliers. Consequently, the efficiency of JIT delivery was largely compromised.

Having suffered through the experience that many previous employees had become new competitors in the same industry, Company C almost did not trust anyone, and raised self-protection to an extremely high level. Managers designed very specific contract terms trying to cover as many contingencies as possible. As soon as the contract was signed by both parties, no more negotiation would be allowed. The company also inspected and verified every batch of items delivered by suppliers as all the other three companies did. As the purchasing manager of Company D explained, Chinese suppliers frequently use inferior materials and cheated on production processes, even though premium purchasing prices were paid by buyers. In short, the level of trust between the four manufacturing firms and their SC partners was incredibly low. Both parties just suspected each other of opportunistic behaviours. Trusting other partners would be at one’s own risk.

Nevertheless, a significantly high level of trust between very limited numbers of SC
partners was also observed. Company A was a good example. One of the customers – a Fortune 500 international company – exerted a considerably high level of trust in Company A and used it as a sole supplier. This customer treated Company A as one of its own departments and collaborated with it faithfully. In appreciation for the high degree of trust, Company A provided products and services to this customer with the highest quality and offered continuous price cuts every year. Consequently, the collaboration between the two firms was highly extensive. Another example was the collaboration between Company A and one of its strategic suppliers. Since the supplier owned core technology but was lacking funds to purchase facilities, Company A made asset-specific investment in this supplier by purchasing all the facilities and tools, then contracted the management of the facilities to this supplier. Both firms trusted each other and had been cooperating seamlessly for more than twenty years. As such, despite the prevalent low level of trust among SC partners, some high level of trust could still be developed.

5.1.3.3 Power Asymmetry

Power asymmetry was found to be significant between Companies B, C, D and their SC partners (see Table 5.3). The production manager of Company B claimed that his company realized that abuse of coercive power to take advantage of weaker partners was inappropriate. The production manager also stated that Company B tried to share more valuable information with suppliers. For instance, instead of sharing a weekly plan only, Company B tried to share monthly and annual plans with suppliers as well, as to how seasonal variation was distributed and how annual production capacity was allocated. However, a significant power asymmetry could still be observed. For example, the IT manager believed that, instead of sharing more information with suppliers, Company B preferred to make sure suppliers’ information was visible. He also contended that franchisees were cunning and that no valuable information should be shared with them. Overall, as a focal manufacturing firm, Company B held more power than its SC partners.

The power asymmetry between Company C and its SC partners was more significant. Since Company C had no idea about the importance of collaboration with suppliers, squeezing suppliers for cost minimization was still the main focus of its SCM effort. Customers forced Company C to provide the lowest prices, who, in turn, forced
suppliers to quote the lowest prices. Once suppliers signed the contract with Company C, they had to fulfil their responsibilities no matter how the prices of raw materials fluctuated. Apparently, there was substantial power asymmetry between Company C and its SC partners.

Power asymmetry between Company D and its SC partners was prominent in that coercive power was widely used by domestic customers. As focal manufacturing firms, these domestic customers did not care about Company D’s interests and abused coercive power to appropriate great value for themselves. They demanded sharp price cutting, extremely short lead time, and switched orders between suppliers without any consideration of the suppliers’ production plans. These customers also made use of VMI to force Company D make early production and accept much longer time for payment. Company D was even not allowed to count its own stock in customers’ warehouses, and would suffer great loss if the goods were never used. As a result, Company D resented the exploitative use of power by these customers and even terminated the business relationship with one of the major domestic customers. Thus, power asymmetry exerted a great negative impact on SCC between Company D and its SC partners. Table 5.3 summarizes the cross-case comparison in SC partnering practices.

Table 5.3 Cross-case Comparison of SC Partnering Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
<th>Company D</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC Partnering</td>
<td>Building up partner relationships with SC partners.</td>
<td>Trying to build up partner relationships with suppliers.</td>
<td>Arm’s-length relationships with SC partners.</td>
<td>Adversarial or hostile relationships with SC partners.</td>
</tr>
<tr>
<td>Supplier Development</td>
<td>Offered wide array of assistance to suppliers.</td>
<td>Provided some assistance to suppliers.</td>
<td>Provided some support to suppliers.</td>
<td>Suppliers provided supervision.</td>
</tr>
<tr>
<td>Power asymmetry</td>
<td>Relatively equal relationship.</td>
<td>Disagreed with using power to take advantage.</td>
<td>Used power to take advantages.</td>
<td>Disadvantaged by power asymmetry.</td>
</tr>
</tbody>
</table>

5.1.4 Process Integration

The SC processes of the four manufacturing firms under investigation required substantial integration (see Table 5.4). By comparison, the SC processes of Company A were better integrated than all the other three companies. Company A adopted JIT operation from the 1990s and lean operation from 2006 to remove redundancies and
improve operational efficiency. Currently, the JIT operation of this company is already very mature. Daily and hourly JIT deliveries were provided by Company A to both international and domestic customers. Suppliers also offered JIT delivery of raw materials to Company A. The lean manufacturing of Company A was far behind that of international customers but comparatively better than other CMFs. The lean initiative of Company A involved many perspectives, such as the layout of facilities, inventory control, and the flow of materials. Continuous and creative improvement was encouraged and rewarded. However, optimization of the SC processes of Company A was necessary. The scheduling of production planning was inaccurate and had caused many problems and extra costs. Coordination between different departments had to be improved to ensure accurate information was provided and raw materials could be delivered on time, so that a vicious cycle could be eliminated to smooth the whole SC process.

The SC processes of Company B required substantial integration as well. This company started JIT operation and lean manufacturing after 2009. More than 70 per cent of spare parts were delivered by suppliers in half an hour to two hours. More than 30 per cent of inventory cost had been reduced. On the other hand, to make further improvements with JIT operations, many issues needed to be addressed, such as sharing extra costs associated with smaller order quantities and more frequent deliveries, standardization of packaging of spare parts, and reasonable quality inspection. Lean manufacturing was employed, but only limited effort had been made toward streamlining the manufacturing process. Therefore, the SC processes of Company B needed to be integrated and optimized considerably.

The SC processes of Company C were slightly better integrated than those of Company B, but also required substantial integration. If a few new products were launched together during the peak season, the limitation of manufacturing processes would become apparent. Both JIT and lean approach were inapplicable, because most of the orders had different specifications and were in small quantities, so that the continuity of production could not be maintained. As Company C kept most of its production in-house, lean manufacturing was employed to realize cost reduction, lead time shortening, and quality improvement. For example, lead time was shortened through changes of processes, structure and materials. Production efficiency was improved by simplifying the design of products, changing the layout of facilities to synchronize the
processes, and making reasonable arrangements of workforces. Nevertheless, ongoing effort was essential for Company C to make continuous integration of its SC processes.

Since both customers and suppliers of Company D dominated the market, the process integration of Company D was conducted internally. As the customers had switched sourcing strategies from cost minimization to better quality, Company D had put more emphasis on quality control and streamlining production processes. Company D offered JIT delivery of products to customers’ warehouses as requested. Lean manufacturing was employed to enable standardization and simplification of production processes, better utilization of facilities, and maximization of production capacity. As a result, consistency of quality was enhanced.

5.1.4.1 Sales and Operation Process

The S&OP processes of Companies A and B were much better than those of Companies C and D (see Table 5.4). Both Companies A and B understood the significance of demand forecasting and planning, and started to develop their own rolling forecasts. However, these processes were immature and needed to be formalized to achieve improved matching of demand and supply.

Company A was lacking in sophisticated forecasting tools, but generated forecasts based on historical data and predicted customer demand. Information offered by different departments had to be exported and imported between different information systems to make further analysis. Forecasts was only used for preparation of raw materials and workforces but not for actual production. As such, the planning of Company A was inaccurate and often had to be changed at the last minute.

Similarly, due to lack of advanced forecasting tools, Company B computed 3+3 rolling forecasts using spreadsheet, email, and telephone. The forecasts were mainly based on historical data and qualitative estimation. Estimates of future sales collected from more than 10,000 franchisees, combined with discount and promotion policies, were used to adjust monthly forecasts. The spreadsheets of aggregated demand and planning information were emailed to suppliers for them to make their own production and delivery plans.
The forecasting provided by international customers of Companies A and C was much more accurate than that by domestic customers. Generally, leading international customers shared annual, seasonal, monthly, weekly and daily planning and forecast information with Companies A and C through on-line platforms. This information was crucial and extremely helpful for Companies A and C to make their own planning and forecasting accordingly. The overall forecasting error of international customers was less than 10 per cent.

Although accurate planning and forecasts were provided by Company C’s major international customers, Company C only used them for their own planning, but did not share information with its suppliers. Company D claimed that it was impossible for them to do forecasting and planning because customers never provided an accurate plan for them but demanded extremely short lead times to finish production and make delivery. Otherwise, they would just switch orders to other suppliers without any consideration of Company D’s production capacity and planning.

5.1.4.2 VMI Operation

The VMI initiative was adopted by Companies A, D and their SC partners (see Table 5.4). Company A served major leading international customers by building warehouses near customers’ plants throughout the world to manage inventories. Safety inventory was held so that Company A had enough time to replenish the inventory if demand changed. Frequent communication was not necessary as long as safety inventories were available. However, a different mode of VMI was employed by domestic customers of Company A. It was mainly used by them to prompt suppliers to organize production in advance rather than for reducing overall inventory in the SC. As a leading supplier of domestic customers, Company A had relatively equal power to customers, and therefore would not arrange production unless an order was actually received. If the inventory produced was not used before the deadline, domestic customers were required to take responsibility and make payment.

The situation was much worse for Company D. As the market was very competitive and therefore customers had more sourcing options, customers tended to set exploitative VMI policies for Company D. The company was required to deliver goods to customers’ warehouses, but payment was not settled until the goods were actually used. Company
D was not allowed to count its own stock in customers' warehouses. Therefore, it had no idea how much of its own inventories were accumulated in customers' warehouses, and had to wait for the customers to update the information. As a result, Company D suffered great loss because of the implementation of the VMI approach.

5.1.4.3 Distribution Process

Distribution processes of all the four manufacturing firms investigated were not yet appropriately designed (see Table 5.4). All of them either contracted transportation to 3PLs or pushed costs to suppliers. A few of them had noticed the low efficiency of logistics operations. However, it would take a great deal of effort to improve their distribution capabilities.

Table 5.4 Cross-case Comparison of Process Integration Practices

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
<th>Company D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process Integration</strong></td>
<td>Substantial integration is required.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lean Manufacturing</td>
<td>Relatively better than other Chinese manufacturers.</td>
<td>Minor improvement to streamline the production processes.</td>
<td>Realized cost reduction and lead time shortening.</td>
<td>Simplification of manufacturing processes.</td>
</tr>
<tr>
<td>VMI</td>
<td>Different VMI between domestic and international customers.</td>
<td>N/A</td>
<td>N/A</td>
<td>Disadvantaged by partially imitated VMI policies of customers.</td>
</tr>
<tr>
<td>Distribution Process</td>
<td>Not designed.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.1.5 Collaborative Synchronization

Collaborative synchronization of all the four manufacturing firms investigated was not observed (see Table 5.5). End-to-end SC visibility of all firms was not available, and critical information needed for SC operation and decision making was unknown. Synergistic planning and forecast capability, and inventory optimization, were not in place either.
5.1.5.1 Collaborative Innovation

All four companies realized the importance of leveraging suppliers’ technological and innovative competencies for their own success, and had therefore involved suppliers in NPD activities (see Table 5.5). For example, the technology department of Company A was responsible for communication with customers for NPD. Suppliers were also consulted for the selection of component parts to reduce cost and improve performance. In the case of Company B, suppliers were involved throughout the NPD process and consulted for the design of outlines, structures and the selection of components as well. There had also been extensive communication between the R&D department of Company C and SC partners about product innovation. Company D was engaged in the NPD of customers so that the manufacturing processes could be simplified for lower cost. The cross-case comparison of collaborative synchronization is shown in Table 5.5.

Table 5.5 Cross-case Comparison of Collaborative Synchronization

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
<th>Company D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative Synchronization</td>
<td>Not observed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC Visibility</td>
<td>Not available</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synchronized DP</td>
<td>Not observed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IO</td>
<td>Not observed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative Innovation</td>
<td>Adopted</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

5.2 Summary of Cross-Case Analysis

Based on the overall performance of the four investigated manufacturing corporations in the five major elements of SCC – SC objective alignment, information sharing, SC partnering, process integration, and collaborative synchronization – the current levels of SCC in the Chinese E & E manufacturing industry can be classified into four types, which can be labelled as “Developing”, “Beginning”, “Limited”, and “Very Limited” (see Figure 5.1).

Supply chain collaboration observed between Company A and its strategic SC partners falls in the first category of “Developing”. Characteristics of the collaboration between the two parties include the following: (1) SC objectives for long-term SCC were
established; (2) incentives were aligned to share costs and benefits; (3) wide array of tactical and operational information was shared; (4) level of trust was high and multiple supplier development initiatives were taken; and (5) planning and forecasting information was shared timely and accurately. In essence, collaboration between Company A and its strategic SC partners is in place and ongoing, but that with other non-strategic partners still remains adversarial.

Figure 5.1 Different levels of SCC of Companies A, B, C, D

Collaboration between Company B and its SC partners falls in the second category of “Beginning”. Company B realized the importance of adopting a SC vision and started to build up its common interest community. However, SC common objectives were difficult to achieve, owing to the fact that some of the suppliers were speculative. Company B started to consider sharing the extra cost that was caused by small order quantities and more frequent deliveries on the supplier side as a result of the JIT initiative. Company B believed that abuse of mediated power by bullying the weaker partners was inappropriate. A rolling 3+3 planning and forecast for the next six days was shared with suppliers on a daily basis to facilitate JIT supply. In sum, the collaboration between Company B and its SC members has just started.

Collaboration between Company C and its SC partners falls in the third category of “Limited”. International customers shared tactical and operational information with Company C who, however, shared very limited information with its suppliers in turn. Company C was internally connected through the SAP information system, but the connection with suppliers was not established. Cost minimization was the main focus
of the majority of its customers. The supplier relationship was purely transactional, in
that trust was limited to contractual and with strong power asymmetry. Basically, the
collaboration between Company C and its SC partners was adversarial.

Collaboration between Company D and its SC partners falls in the last category of “Very
Limited”. Company D believed that it was the victim of SCC practices. There was no
strategic relationship between Company D and its SC partners or customers, as the
latter were rarely concerned about Company D’s interest. Similar to Company C, the
level of trust between Company D and its SC partners was very low and power
asymmetry was prominent. Company D believed that it was victimized by VMI practices
because all its customers adopted VMI to push inventory risks and costs to upstream
suppliers. Essentially, Company D did not believe in SCC in the sense that it suffered
from higher costs and risks associated with SCC initiatives.

Through a cross-case comparison between the four companies investigated in this
research, some common themes were identified, which are underlined in Table 5.6.
Both Companies A and B set common SC objectives with strategic SC partners, but
not Companies C and D. However, it was difficult for both Companies A and B to
achieve those objectives because some suppliers were speculative. The CEOs of
Companies A and B were engaged in SCC initiatives proactively. Their engagement
was regarded as critical to the implementation of SCC initiatives in terms of resource
allocation, removal of resistance, resolving conflicts and so on. Since the top
management of Companies C and D was lacking in awareness of SCC, their
involvement was not seen. The CEO of Company C, especially, held a very
conservative attitude towards SCC because of some negative experiences.

The level of information sharing between Companies B, C, D and their SC partners was
very low. First of all, these companies were lacking in inter-organizational information
systems. The connections between these companies and their SC partners were either
unavailable or under development. Massive investment and resources were required
to facilitate inter-organizational connection and communication. Secondly, the quality
of information shared by these companies and their SC partners was relatively poor.
The accuracy of data collected and shared had to be improved significantly. The
frequency of information sharing needed to be increased enormously to facilitate
internal and external integration. Lastly, unwillingness to share information was strong, which could be a major inhibitor to higher levels of information sharing.

Table 5.6 Cross-case Comparison of the Four Companies

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Company A (Developing)</th>
<th>Company B (Beginning)</th>
<th>Company C (Limited)</th>
<th>Company D (Very Limited)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCoA</td>
<td>Partly aligned</td>
<td>No SCoA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Executive Sponsorship</td>
<td>Proactive involvement</td>
<td>No involvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incentive Alignment</td>
<td>Costs and risks were</td>
<td>Limited or no cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>shared with strategic SC partners.</td>
<td>and risk sharing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Sharing</td>
<td>Extensive IS.</td>
<td>Limited information sharing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Connectivity</td>
<td>Partly connected.</td>
<td>Lack of information systems</td>
<td>Well-connected internally and externally only with customers.</td>
<td>Lack of information systems</td>
</tr>
<tr>
<td>Quality of Information</td>
<td>Relatively high.</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Willingness to Share</td>
<td>Relatively high.</td>
<td>Unwilling to share</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>information</td>
<td>information</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>systems</td>
<td>systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC Partnering</td>
<td>Built up partner</td>
<td>Superficial</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>relationships with a few SC partners.</td>
<td>partnership with SC partners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplier Development</td>
<td>Adopted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual Trust</td>
<td>Trust with strategic SC partners.</td>
<td>Very low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power asymmetry</td>
<td>Relatively equal</td>
<td>Significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>relationship.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Integration</td>
<td>Substantial process integration is required.</td>
<td>Daily or hourly JIT delivery</td>
<td>Unsuitable</td>
<td>Daily or hourly JIT delivery</td>
</tr>
<tr>
<td>JIT Initiative</td>
<td>Daily or hourly JIT delivery</td>
<td>Unsuitable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lean Manufacturing</td>
<td>Relatively better than other Chinese manufacturers.</td>
<td>Low level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S&amp;OP Process</td>
<td>Need to be formalized</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMI</td>
<td>Disadvantaged by VMI</td>
<td>Unsuitable</td>
<td>Disadvantaged by VMI</td>
<td></td>
</tr>
<tr>
<td>Distribution Process</td>
<td>Not designed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative Synchronization</td>
<td>Not observed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC Visibility</td>
<td>Not available</td>
<td></td>
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<tr>
<td>Synchronized DP</td>
<td>Not observed</td>
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<tr>
<td>IO</td>
<td>Not observed</td>
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<td></td>
</tr>
<tr>
<td>Collaborative Innovation</td>
<td>Not observed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Barriers</td>
<td>• Lack of awareness of SCC,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Lack of trust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Abuse of mediated power,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Transactional relationship,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Weak information sharing capability,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Institutional constraints including lack of legal protection, unstable government policies and culture.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The partner relationship between all four companies and their SC partners was mainly superficial and transactional. While Company A had built up collaborative relationships with a few strategic SC partners underpinned by high levels of mutual trust, the relationships between this company and all its non-strategic SC partners were mainly at arm’s length. In general, the level of mutual trust between all four companies and their SC partners was generally very low. Power asymmetry between Companies B, C, D and their SC partners was significant. Abuse of coercive power by leading focal manufacturing firms was prevalent. Instead of sharing costs and risks with SC partners, these companies intended to maximize their own interests and push all costs and risks to upstream suppliers. Nevertheless, supplier development initiatives had been employed by all companies and their SC partners to enhance SCM capability of the suppliers.

The SC processes of all four companies needed substantial integration and optimization. The manufacturing processes of those companies were mainly labour intensive, with low added-value and limited know-how. Those processes were designed and subdivided so that uneducated new workforces could be recruited and trained within half an hour to become skilled workers. Limited advanced machinery was deployed to improve efficiency and quality. It is believed that large amounts of waste and redundancy could be eliminated through simplified design, reasonable layout, streamlined processes, and continuous improvement.

Collaborative synchronization between the four companies and their SC partners was very limited. Owning to the weak information sharing capability, SC visibility was generally very low. Collaborative planning and forecasting was inaccurate because of the poor quality of information shared between parties. Consequently, the bullwhip effect was prominent and could not be eliminated even though the practice of collaborative planning and forecasting was adopted. VMI was employed primarily to push inventory costs to upstream suppliers rather than to maximize the benefits of the entire SC. As a result, the significant benefits of SCC could not be capitalized to attain competitive advantage.

The common major barriers encountered by all four companies include lack of awareness of SCC, lack of mutual trust, abuse of coercive power, transactional relationship, weak information sharing capability, and institutional constraints, such as
the lack of legal protection, unstable government policies, and traditional Chinese culture.

5.3 Chapter Summary

This chapter has made a cross-case comparison between the collaborative behaviours of the four manufacturing firms under investigation. The collaborative practices of the four manufacturing firms were classified into different levels according to their performances on five major perspectives. Pursuant to the within-case analysis and cross-case comparison made in Chapter 4 and Chapter 5 respectively, the next chapter will discuss the research findings and develop a framework of SCC for CMFs.
CHAPTER 6  Findings and Discussion

This chapter provides an overview of the research findings. The main characteristics of SCC of the Chinese E & E manufacturing firms are discussed first. Then, weaving together the research findings and the literature, the key elements of and the institutional barriers to successful SCC in China are analysed.

6.1 Overview of the Findings

Drawing from AT, SET, Institutional Theory, and SCC literature, the present research sought to provide insights on how effectively SCC is being implemented by the Chinese manufacturers. This research empirically examined the five key elements of and seven institutional barriers to the successful implementation of SCC by the firms under investigation (see Table 6.1). The findings reveal that multiple Western SCC practices are being implemented by the Chinese E & E manufacturing firms. However, they are not adopted in whole but are partially imitated by the firms for maximization of their own short-term benefits at the expense of the overall SC performance and efficiencies.

<table>
<thead>
<tr>
<th>Key Elements</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SC Objective Alignment</td>
<td>Executive sponsorship was critical to the successful implementation of SCC practices.</td>
</tr>
<tr>
<td>2. SC Partnering</td>
<td>Superficial partnership was the dominating relationship among Chinese firms.</td>
</tr>
<tr>
<td>3. Information Sharing</td>
<td>Level of information sharing was far from desirable.</td>
</tr>
<tr>
<td>4. Process Integration</td>
<td>Partial imitation of Western practices had been used to take advantage of SC partners.</td>
</tr>
<tr>
<td>5. Collaborative Synchronization</td>
<td>Advanced collaborative synchronization was not observed.</td>
</tr>
</tbody>
</table>

The findings of the present research corroborate all four underpinning theories used.

Institutional Barriers

1. Lack of awareness of SCC
2. Lack of trust
3. Abuse of power
4. Transactional relationship
5. Weak information sharing capability
6. Insufficient government effort and innovation
7. Guanxi
They show that the Chinese manufacturers and their SC partners behave opportunistically for own benefits and tend to exploit each other, which is consistent with the tenet of traditional AT. The results also exhibit that there is increasing collaboration between CMFs and their strategic SC partners in an effort to obtain collaborative competitive advantage, which is in line with both contemporary AT and ERBV. The findings further demonstrate that the level of trust between manufacturing firms and their SC partners can be enhanced or worsened, which coincides with the reward proposition and the aggression proposition of SET. The study also indicates that institutional factors exert considerable impact on how manufacturers implement SCC, which corroborates Institutional Theory.

6.2 Characteristics of SCC in the Chinese E & E Manufacturing Industry

The following unique characteristics of the SCC elements in China were observed:

6.2.1 Executive Sponsorship

For the element of SCOA, the findings indicate that executive sponsorship was critical to the successful implementation of SCC practices among the CMFs. This is consistent with the outcome of many other studies that confirm the significance of executive sponsorship in SCC initiatives (Mentzer et al., 2000; Ellram, 1991c; Frankel et al., 2002; Daugherty et al., 1996; Bowersox et al., 2003; Fawcett et al., 2008a; Pagell, 2004; Baumann and Andraski, 2010). Executive sponsorship plays a key role in the effective implementation of SCC in terms of communicating shared SC vision, deploying valuable resources, sharing useful information and fostering collaborative relationship with strategic SC partners (Wu et al., 2014; Li and Lin, 2006; Mentzer et al., 2000). The involvement of executive sponsorship is considered to be the most critical factor for the success of collaborative programs (Krause and Ellram, 1997; Modi and Mabert, 2007). Especially in China, executive sponsorship is the single most important factor for the adoption of new initiatives (Chen and Wu, 2007; Chen et al., 2010). This is because in the Chinese culture the senior executive in charge is the only person in the company to make all decisions. Without the support of executive sponsorship, the chances of success in embracing SCC initiatives by the CMFs would be very slim. The findings of
the present research corroborate those of previous research by emphasizing the importance of executive sponsorship in the implementation of SCC by Chinese manufacturers.

6.2.2 Superficial Partnership

For the element of SC Partnering, the findings suggest that superficial partnership is the dominating type of relationship between the investigated Chinese manufacturers and their suppliers. Superficial partnership is observed by some SC scholars to be a common approach adopted in Western countries (Szczejkewski et al., 2005; SMMT and DTI, 1994). This type of relationship is also described as close but adversarial (Mudambi and Helper, 1998) or collaboration without trust (MacDuffie and Helper, 2006), which implies that collaboration is built up without embedded mutual trust and commitment. MacDuffie and Helper (2006) further explain that it is easy to set up the formal aspect of collaborative alliance between SC partners, but very difficult to develop the informal mutual trust and commitment that is closely associated with historical reciprocity between both parties.

Traditionally, the buyer-supplier relationship in China has been kept at arm’s-length or is adversarial. Mutual suspicion is inherent in collaborative activities. Although SC partners might work together to create synergy, they do not trust each other. This finding is in line with AT, which argues that, in agency relationships, given that profit maximization and self-interest persist, the principal attempts to minimise agency costs while the agent inclines to maximize rewards (Eisenhardt, 1989b; Fleisher, 1991). In the SC context, conflict between buyers and suppliers exists constantly, and the SC member is likely to attempt to exploit other members (Ketchen Jr. and Hult, 2007). Especially in China, the level of trust between buyer and supplier is generally low, which would not be improved easily because of the establishment of partnership on its own. As a result, the so-called partnership is often transactional in nature. The finding of this research further validates the prevalence of superficial partnerships between the Chinese E & E manufacturing firms.

6.2.3 Low Level of Information Sharing Capability

For the element of information sharing, the findings reveal that the level of information
sharing between the Chinese E & E manufacturing firms is very low. This corroborates existing research findings (Chen et al., 2007; Lockstrom et al., 2010). Mostly as in requested by international or domestic customers, CMFs have started to build up IOS, but while rarely acknowledging the strategic importance of information sharing to business success. Some of them have invested large amounts of funding in various types of information technology during the past few years. However, only very limited information has been shared between SC partners, let alone the realization of the strategic value of information systems. This is because a variety of problems were encountered by most firms during the implementation of inter-organizational information systems, which can manifest not only in inadequate and fragmented physical information connectivity but also in strong cultural unwillingness to share information.

Previous research asserts that huge investment and great effort in information sharing would not ensure business success unless there is a co-existence of physical information linkages up and down the SC, and a well-cultivated information-sharing culture between SC partners (Fawcett et al., 2007; Fawcett et al., 2008b; Fawcett et al., 2011; Prajogo and Olhager, 2012; Frohlich and Westbrook, 2001; Min et al., 2005). Apparently, the CMFs are naïve in both IT implementation and information-sharing skills. In this sense, the present study reveals the weakness of the CMFs’ information-sharing capabilities, and points out the urgency for them to make substantial improvement in this regard.

6.2.4 Partial Imitation of SCC Processes

For the element of process integration, partial imitation of SCC processes prevails among CMFs. Findings from the interviews reveal that a variety of SCC practices have been employed by different firms, which suggests an increasing trend of the adoption of SCC by the industry in recent years. This is consistent with contemporary AT, which asserts that the rivalry for self-interest and profit maximization will ultimately be substituted by cooperation and collaboration in an effort to generate added-value for consumers (Jensen and Meckling, 1976; Eisenhardt, 1989b). However, most of the SCC processes were incorrectly implemented by CMFs. Under hyper-competitive market pressure, managers try to seek solutions to reduce costs and increase profit.
While SCM and SCC are frequently considered to be able to meet these purposes effectively, SCM and SCC initiatives are easily accepted. Owing to a lack of deep understanding about the nature of SCC, or to deliberately manipulating standard operations for opportunistic aims, firms commonly take a local perspective, borrowing the concept of SCC to solve immediate problems and reap short-term benefits. This is in line with Simatupang and Sridharan (2002) and Fisher (1997), who observe that SC partners habitually have a local perspective, operating as a separate unit and conducting opportunistic behaviour. Partial imitation of some facets of the successful SCC models is unlikely to create value and advantage, because this kind of behaviour occurs at the expense of other members and diminishes overall profitability. Thus, it is very unwise for the CMFs to continue to implement SCC practices in an adversarial manner.

### 6.2.5 Lack of Advanced Collaborative Synchronization

For the element of collaborative synchronization, neither on-site observation nor subsequent analysis of research findings has revealed any advanced collaborative synchronization. The existing collaborative initiatives are confined to initial coordinative activities, such as the exchange of operational information with suppliers and the sharing of planning and forecasts by international customers. Given the current low level of information-sharing capability, superficial partner relationships, and lack of knowledge of SCM, it can be argued that the realization of advanced collaborative synchronization appears to be a great challenge for CMFs.

In summary, the observations reveal that, for the CMFs, four out of the five key elements of successful SCC implementation are either non-existent or being used by individual firms for local benefit at the expense of the overall performance of the entire SC. SCOA, as a result of strong executive sponsorship, is the only element that serves as a driver for SCC implementation in a couple of cases. These findings clearly indicate that SCC among the CMFs is still at a “brewing” stage, with various capabilities to develop and barriers to overcome before an advanced and a mature stage of collaboration can be reached.
6.3 Institutional Barriers to SCC

Based on the analysis of research findings, some institutional barriers that significantly inhibit the implementation of SCC between SC partners were repeatedly mentioned by the interviewed managers. These barriers include lack of awareness of SCC, low trust dynamics, abuse of mediated power, weak information-sharing capabilities, transactional relationships, insufficient government effort and innovation, and Guanxi. In comparison with the proposed theoretical framework presented at the beginning of the present thesis, abuse of mediated power is revealed to be an additional major barrier. As weak information-sharing capabilities and transactional relationships have been discussed as part of the characteristics of SCC in the Chinese context above, only the other five major barriers are to be discussed in the following sections.

6.3.1 Lack of Awareness of SCC

Being consistent with existing research findings (Handfield and McCormac, 2005; Daly and Cui, 2003), the outcome of the present research indicates that lack of awareness of SCC among the CMFs is common. It is observed that the interviewed senior managers rarely had comprehensive understanding about the meaning of SCM and SCC, let alone holding a SC vision and collaborative attitude. Consequently, the implementation of SCC practices tends to be superficial, and the effectiveness of those approaches is largely undermined. Easton (2003) observes that finding and retaining professionals in the SCM discipline is one of the most difficult tasks for CMFs. Consequently, lack of awareness of SCC will remain as one of the major barriers to the extensive collaboration of CMFs for some time to come.

6.3.2 Low Trust Dynamics

The present research findings disclose that the Chinese E & E manufacturers and suppliers are in a vicious circle of low trust dynamics. This means that a low level of trust leads to disbelief and misunderstanding which, in turn, further undermines the low level of trust (Fox, 1973). The interviewed managers uncover that the focal manufacturers did not trust the suppliers owing to the fact that the latter frequently conduct opportunistic behaviours for maximization of their own benefits. As a result, the
focal manufacturers have to strictly control as much information as possible and heavily rely on very detailed contracts or monitoring mechanisms to prevent potential unethical activities of their suppliers, so that they would not suffer heavily from inferior components or unexpected supply disruptions. As managers from the focal manufacturing firms pointed out repeatedly, they could not trust their suppliers, otherwise their companies would be in trouble.

On the other hand, suppliers did not trust the focal manufacturers either. Suppliers seldom believe that focal manufacturers would truly consider their interests. They try to withhold as much information as they can, especially related to cost and core technology, so that they do not lose their negotiation power in the transactions. As the managers of those suppliers emphasized constantly, they could not trust the manufacturers since the latter never really cared about the benefits of the former but tried every means possible to take advantage of the former. This finding is consistent with SET, which stipulates that organizational attitudes and behaviours are contingent upon the rewarding and penalizing responses of the exchange partners (Homans, 1958; Emerson, 1976; Blau, 1964).

This low trust phenomenon is deeply and culturally embedded in the Chinese manufacturer-supplier relationships. Most of the interviewed managers agreed that the low trust dynamics has been worsened as business competition is further increased. The possibility of making considerable improvement in the short term therefore seems remote. Sako (1997) argues that the mutually reinforcing nature of low trust between business partners makes it very difficult for both parties to take the first courageous step to break the vicious circle, as this will increase the vulnerability of the party that takes the initiative to disclose proprietary information. Especially in a country like China with an ineffective legal system, any effort to display trustworthiness to business partners could be taken advantage of easily. Neither the manufacturers nor the supplier are willing to make the first attempt to develop trust, with the manufacturers preferring to further the monitoring and enforcing of their supplier’s compliance with the much-specified contract terms.

However, the critical importance of trust to collaboration success has been highlighted by a large body of literature (Sako, 1997; Sako and Helper, 1998; Fawcett et al., 2004; Johnston et al., 2004; Cai et al., 2010; Mentzer et al., 2001; Fawcett et al., 2008b;
MacDuffie and Helper, 2006; Zhao et al., 2008; Ha et al., 2011). Lack of trust not only increases transaction costs (Ryu et al., 2008; Beccerra and Gupta, 1999) associated with monitoring, inspection and enforcement, but also prevents the value of SCC from being fully tapped (Beccerra and Gupta, 1999; Sako, 1997; Easton, 2003). In order to reap the benefits of enhanced competitiveness, which can only be generated through collaborative effort, vicious low trust dynamics have to be ameliorated eventually. It would be important for the Chinese manufacturers and their suppliers to make a move to work towards establishing trust without further hesitation.

### 6.3.3 Abuse of Mediated Power

In line with Gulati and Sytch (2007), our research findings reveal that Chinese E & E manufacturers tend to abuse mediated power, i.e. coercive power, reward power, and legitimate power (French Jr. and Raven, 1959), to exploit dependence-disadvantaged suppliers. While the escalating competition continues to squeeze the already razor-thin profit margins, focal manufacturers tend to seek immediate solutions by leveraging their power advantages to appropriate more gains at the expense of the weaker SC partners. Having limited knowledge about the negative impact of the exploitative use of power advantage in the long term on the entire SC, or deliberately resorting to traditional practices for prompt benefits, the Chinese focal manufacturers keep pushing boundaries and forcing their suppliers to comply with their unreasonable requests. Being vulnerable to the influence of customers’ decisions and to the lack of effective mechanisms for monitoring customers’ behaviours, the suppliers usually have no choice but to satisfy the customers’ requests. Our research findings echo those of Nyaga et al. (2013), who contend that, in buyer-supplier relationships with significant power asymmetry, the powerful buyers are likely to take advantage of the weaker suppliers. Having limited options and being fearful of losing business, the latter could be coerced into a disproportionate distribution of gains and costs. However, the powerful party should be also aware that forced participation leads to exit behaviour if opportunity arises (Mentzer et al., 2001).

### 6.3.4 Insufficient Government Effort and Innovation

The research outcomes support the view that insufficient government effort and
innovation is one of the most substantial barriers to the realization of successful SCC in China. The institutional environment in China has long been complained about due to inconsistent government policies and economic uncertainty (Feuling, 2008; Luo, 2007; Luo et al., 2012), as well as continuous changes in regulations (Lau et al., 2002). Similar to Su et al. (2008), most of the interviewed managers were deeply concerned about unstable economic policies and regulations that have considerably affected the SCC operations and performances. For instance, the heavy investment made by the Chinese government in the real estate market, instead of formulating supportive policies for the development of the manufacturing industry, has exerted a negative impact. Driven by brutal competition, continuously mounting cost, and shrinking profit margins, many manufacturing firms have lost confidence in the future of the Chinese manufacturing industry. This situation has intensified their unwillingness to make further investment in collaboration facilities. Instead, they would rather pour huge investment into the booming real estate market, which could provide higher profit returns. As Kong et al. (2016) point out, excessive investment in the real estate by the Chinese government has reduced investment in the manufacturing industry, which is very harmful for the growth of the entire economy. Apparently, insufficient government effort in formulating supportive economic policies has negatively impacted the development of the manufacturing industry and made manufacturers less motivated to invest in SCC.

Insufficient government effort in intellectual property protection and information security issues is also mentioned by the managers during the interviews. They expressed hesitation in their investment in technology and research due to deep concern about the effectiveness of Chinese intellectual property law. Innovations can be easily imitated by peers and are rarely protected by the Chinese law. Manufacturers have to be extremely cautious about information security. On the other hand, the extensive information sharing between SC partners for advanced collaboration seems unrealistic. Consequently, enhanced government effort in intellectual property laws and information security has to be made promptly.

6.3.5 Guanxi

Guanxi is an unwritten rule for businesses to operate in the Chinese context. It might be able to facilitate collaboration as some researchers have argued (Chen et al., 2010).
However, the managers from different companies all believed that the importance of *guanxi* for their outsourcing decision making is moderate. Although *guanxi* can be used by suppliers to get business opportunities, the final decision of the manufacturer is made based on the competitiveness of the supplier in terms of price, quality, service, and other aspects of performance. This means that *guanxi* does not guarantee the preference or priority as it used to do. Some managers even stated that they do not prefer to use suppliers with *guanxi* as it disturbs the selection process and objective decision-making. This might be because, in order to make themselves competitive enough, manufacturers have to choose the most competitive suppliers as their partners for collaboration. Some managers also mentioned that *guanxi* could be a barrier to promoting information-sharing capabilities, as a few major suppliers lack information technologies and pay no attention to the importance of information sharing. Overall, *guanxi* is regarded as having a negative impact on to the implementation of SCC by Chinese manufacturers.

### 6.4 The Capability-based Strategic Framework of SCC

In Chapter 2, a tentative strategic framework was initially developed from existing literature to guide this research. This framework has to be refined according to the empirical outcome of this research generated through critical analysis of data. Based on the research findings and the current SCC literature, a capability-based strategic framework was developed as an effective guide to enhance SCC capabilities of CMFs (see Figure 6.1). Being consistent with the theoretical framework proposed in Chapter 2, this strategic framework comprises the five key elements of and seven institutional barriers to SCC of the CMFs. Contrasting to the theoretical framework which shows only the linkages of key elements and obstacles to the realization of successful SCC, this improved outcome-based strategic framework is able to depict the inter-relationships between the five key elements and seven major barriers. The framework is capability-focused because it explicitly points out the five key capabilities that are essential to successful SCC among the CMFs. They are, adequate organizational capability, collaborative relationship capability, strategic information-sharing capability, sophisticated process capability, and advanced synchronized capability. This framework thus provides actionable insights for practitioners to build key capabilities for the successful implementation of SCC, to attain a competitive edge.
The building process of SCC capabilities can mainly be divided into four stages – (1) Initiation stage; (2) Preparation stage; (3) Capability-building stage; and (4) Maturation stage. The Initiation stage aims at building up the basic organizational capability through the alignment of common objectives between SC members and the involvement of executive sponsorship of different organizations. The Preparation stage focuses on the development of collaborative relationship capability and information sharing capability. Upon development of the three fundamental capabilities, i.e. organizational capability, collaborative relationship capability and strategic information-sharing capability, the Capability-building stage, which involves more sophisticated process integration, can be facilitated. As manufacturers and suppliers keep improving inter-organizational process capability, they would understand more the importance of SCC, become more committed to the partnership, and continuously enhance their willingness to share valuable information in a timely manner. When the first four basic capabilities are cultivated, the Maturation stage featuring advanced collaborative synchronization capability can ultimately be achieved. There is no sharp dividing line between the different stages of collaboration, as this process is evolutionary and progressing over time (Ellram, 1991a and Cooper et al., 1997).

As shown in the framework (Figure 6.1), solid lines indicate the observed impacts of major barriers on each key element. Dotted lines indicate the anticipated interactive impacts between each key element, which have been reported in existing literature but yet to be achieved by CMFs. The following section will provide a detailed description of each of the key elements and sub-elements.
Figure 6.1 A Capability-based Strategic Framework for SCC in China

**A Capability-based Strategic Framework for SCC in China**

**Collaborative Synchronization**
(Advanced Synchronization Capability)
- End-to-End SC Visibility
- Synergistic Planning and Forecasting
- Optimized Inventory
- Collaborative Innovation

**Process Integration**
(Sophisticated Process Capability)
- Streamlined JIT/Lean Operations
- Formalized S&OP Process
- Standardized VMI Operation
- Integrated Distribution Process

**SC Partnering**
(Collaborative Relationship Capability)
- Supplier Development
- Goodwill Trust
- Balance of Power

**Information Sharing**
(Strategic Information Sharing Capability)
- Information Connectivity
- Willingness to Share Information

**SC Objective Alignment**
(Adequate Organizational Capability)
- Executive Sponsorship
- Incentive Alignment

**INSTITUTIONAL BARRIERS:**
- Lack of Awareness of SCC
- Low Trust Dynamics
- Abuse of Power
- Transactional Relationship
- Weak Information Sharing Capability
- Insufficient Government Support and Innovation
- Guanxi
6.4.1 SCOA

SCOA (see Figure 6.1) is the starting point of the implementation of SCC initiatives, which helps to attain organizational capability. It enables every SC member to develop understanding of the common objectives of the entire SC. It also requires each SC member to understand that the alignment of objectives is central to successful collaboration (Mentzer, 1993; Cai and Yang, 2008; Yan and Dooley, 2014; Frankel et al., 2002). Only when the entire SC works towards the same direction can collaborative effort of all chain members create ultimate competitiveness. SCOA constitutes prerequisites for all other collaborative activities. Most of the interviewed managers stated that they attempt to align common goals with key suppliers by signing up agreements. However, suppliers tend to overpromise and end up breaching the agreements readily for more profits, or simply do not believe that customers would truly care about their interests. Not surprisingly, all the effort in the alignment of common objectives between buyers and suppliers would thus turn out to be in vain. This is because, even though common objectives were set, each of the chain members would keep focusing on its own benefit and ignore the benefits of other parties, or even worse, jeopardize the interests of the weaker parties. This type of zero-sum game mind-set of the CMFs is harmful to all collaborative attempts. Crucially, focal manufacturers have to take the interests of their suppliers into consideration and appropriately align common goals with them, rather than using strong power asymmetry to force them to sign agreements. Given that most of the collaborative decisions are made by executives, the involvement of executive sponsorship is essential for the alignment of SC objectives. Put simply, all participants of the SC have to work towards the same direction so that the common goals can be achieved.

SCOA is the precursor to other collaborative initiatives. It serves as a guide for the other four key elements. Only with properly aligned SC objectives would the enhancement of other key elements be meaningful. Properly aligned SC objectives between SC partners are likely to help foster close partner relationships by restricting opportunistic behaviours. SCOA also promotes information sharing between SC partners, given that all participants work towards the same direction. It sets up common goals for SC members, therefore facilitating process integration and enabling collaborative synchronization.
6.4.1.1 Executive Sponsorship

Executive sponsorship (see Figure 6.1) is the sub-element of SCOA. Alignment of SC objectives must be supported by executive sponsorship of all SC members involved in the SCC initiative. Executive sponsorship from every SC organization has to be involved from the start of SCOA process. Only when executive sponsorship initiates the implementation of SCC practices can the chances of success be increased. Many managers interviewed in the present study emphasized that only executives can provide the persuasive influence to promote all employees within the organization to embrace SCC initiatives. Otherwise, staff members would not believe in the move. Many scholars in SCM area agree that executive sponsorship is especially necessary for the removal of internal resistance and scepticism to new concepts like SCC (Ramesh et al., 2010; Frankel et al., 2002; Vieira et al., 2009; Maheshwari et al., 2006). During the deployment of SCC initiatives, executives have to be there to promote awareness of SCC within the organization. They play key roles in terms of setting rules of collaboration, allocating resources, and settling disputes. In addition, with executive sponsorship, organizational capability can be improved in that all functions and individuals have to make an effort to make changes and adapt to the new initiative. Without the strong and steady support from top management, the alignment of SC objectives in the Chinese context would be unachievable.

With the commitment of executive sponsorship of all SC members, SC objectives are more likely to be aligned, partner relationships are more likely to be fostered, and information is more likely to be shared between SC partners. Streamlining and integrating inter-organizational SC processes requires strong support or even the championship of executive sponsorship. Especially, executive sponsorship is critical to the success of S&OP process and cross-organizational collaborative synchronization. In essence, executive sponsorship is fundamental to the implementation of SCC initiatives.

6.4.1.2 Incentive Alignment

Proper incentive alignment (see Figure 6.1) between SC partners has a positive impact on collaborative relationships. It is also critical to the success of SCC. The interviewed
managers frequently mentioned that incentive misalignment is common between manufacturers and suppliers. Manufacturers tend to appropriate most of the gains obtained from collaborative efforts, while pushing all the costs and risks to suppliers. The latter are forced to bear extra costs incurred due to the adoption of collaborative activities initiated by the former, but are rarely rewarded. Consequently, the majority of suppliers have lost their confidence in collaboration with manufacturers, given that suppliers' interests are seldom considered. Obviously, this phenomenon is contrary to the anticipated compensation fairness between SC partners pursuing collaborative goals.

Many past studies have highlighted, the fair distribution of gains and costs is crucial to the achievement of SCC (Zhao et al., 2008; Simatupang and Sridharan, 2004; Matopoulos et al., 2007; Narayanan and Raman, 2004). Narasimhan et al. (2008) suggest that rewards and incentives should be used to demonstrate an intention of the powerful partner to have a long-term collaboration with the weaker partner, so that the latter could value the relationship and accommodate requirements for joint activities. SET posits that the willingness to share gains by the powerful partner incentivizes the reciprocation of positive actions by partners (Eisenhardt, 1989a; Logan, 2000). As such, an incentive alignment mechanism has to be built to motivate SC members to work towards their mutual strategic objectives and ensure optimal decisions are made for the entire SC (Simatupang and Sridharan, 2005b).

### 6.4.2 SC Partnering

SC partnering (see Figure 6.1) is one of most critical determinants of successful SCC. It is the most capricious and intricate facet of collaboration, while essential to all collaboration activities (Lambert et al., 2004). The aim of this key element is to nurture a collaborative relationship capability. Findings in the present research reveal that the current SC partnership between CMFs is mainly adversarial in nature. Buyer and supplier might work together for a common purpose when necessary. Nevertheless, they might also constantly negotiate with each other for a bigger share of benefits. Both parties could be opportunistic thus exploiting the other party whenever possible. As some managers pointed out the so-called partnership is purely transactional. With a transactional partnership, both parties are price-oriented and tend to vigorously pursue
their own interests (Williamson, 1998). This type of partner relationship discourages information sharing (Sako, 1994; Mahapatra et al., 2010), inhibits the fair distribution of gains and risks between SC partners (Cooper and Gardner, 1993; Hoyt and Huq, 2000), and hinders knowledge transfer (He et al., 2011). The superficial partnership between the Chinese manufacturers and their suppliers would impede the implementation of SCC, therefore losing the feasibility to generate a collaborative competitive edge. This situation would be fatal to the future of the entire manufacturing industry. Consequently, it can be argued that both manufacturers and suppliers are necessary to understand the significance of real partnership in successful collaboration, and develop collaborative partnerships with strategic partners (Goffin et al., 2006). With continuous effort, partnerships will develop gradually based on mutually satisfied performance and steady cultivation of trust (Ellram, 1991c). Only when collaborative partnership is established would it be possible for SC partners to leverage SCC to create synergy, improve operational performance, and acquire collaborative competitiveness. Based on the findings of this research, the closeness of partnership is largely determined by four sub-elements, namely incentive alignment, supplier development, mutual trust, and power asymmetry.

6.4.2.1 Supplier Development

Supplier development (see Figure 6.1) is an effective way to improve supplier performances and capabilities therefore enhancing manufacturer-supplier relationships. Supplier development activities promote an atmosphere of cooperation (Sanchez-Rodriguez et al., 2005; Humphreys et al., 2005), which encourages continuous collaboration and long-term partnership (Hartley and Choi, 1996). According to the interviewed managers, a variety of supplier development initiatives have been employed by the CMFs, but most of these initiatives are limited to basic technology assistance. It can be argued that those manufacturers have started to understand the importance of suppliers to their success. One of the interviewed managers emphasized that if they do not treat suppliers well, the latter would not share their latest innovations with the former. However, the investment in resources and time made by manufacturers on supplier development is primarily confined to quick problem fixes, and often comes with conditions for immediate price reduction or profit return. More advanced supplier development initiatives, such as asset specific investment by the manufacturer, are
rarely observed.

Traditionally, suppliers of the Chinese manufacturing industry feature family workshop, lack of high technology, and short-term interest-oriented family businesses. Both manufacturers and suppliers have no intention to make investment in continuous learning and transfer of tacit knowledge internally or externally. To enable them to compete in a global market, manufacturers need their suppliers to upgrade performance and capabilities to not only match their requirements but also enhance their competitive edge. Unfortunately, owing to a lack of resources and knowledge, many suppliers are less capable of catching up with the customers’ advances. It is essential for manufacturers to guide suppliers and enable both parties to engage in continuous learning and knowledge-sharing activities, instead of frequently replacing their suppliers, so that suppliers can make improvement and enhance capabilities.

6.4.2.2 Mutual Trust

Mutual trust (see Figure 6.1) is a key relational mechanism in governing and coordinating inter-organizational activities (Lai et al., 2008; Ireland and Webb, 2007). It is deemed to be the cornerstone for the development of a satisfactory partnership (Johnson et al., 2004; Nyaga et al., 2010; Spekman, 1988). It is also identified as the most crucial prerequisite and facilitator to the success of inter-organizational collaboration (Fawcett et al., 2008a; Ryu et al., 2009). While low trust dynamics was the dominant theme discussed by most of the managers interviewed, this research also observed the existence of goodwill trust between limited numbers of strategic SC partners. This finding implies that a high level of mutual trust can be nurtured even in an environment in which low trust is ubiquitous.

Hallen et al. (1991) consider that the process of fostering mutual trust increasingly evolves, while trustworthiness is reciprocally and consecutively presented by partners. One of the interviewed managers noted that various forms of trust enhancement, such as accurate and timely information exchange, supplier development, investment in dedicated or specific assets, and long-term commitment, have been employed by his firm to entail the transitioning of contractual trust into goodwill trust. More specifically, reliable product quality and continuous cost reduction are provided to customers to indicate the firm’s competence in product quality and willingness to subordinate their
own immediate interests to a positive outcome for long-term mutual interests. Consequently, the supplier’s benevolence is rewarded by customers designating the supplier as the sole source of supply. Simultaneously, the firm provides technical and financial assistance, asset-specific investment, and long-term commitment to suppliers, to demonstrate its trustworthiness. In this way, the perceived likelihood that suppliers’ vulnerability would be exploited by this manufacturer is considerably lowered. As a result, this manufacturer’s favourable behaviours are appreciated by some strategic suppliers, who reciprocate commitment to the exchange relationship, although these initiatives are also disadvantaged by speculative behaviours of a small number of suppliers. As both parties have engaged in the constant exchange and maintenance of a high level of commitment and credibility, the contractual trust within the relationship gradually evolves to a high level of goodwill trust.

This typical example of trust-building initiative sheds light on the possibility of the cultivation of goodwill trust between manufacturers and suppliers in China through a gradual evolving process. Sako (1997) demonstrates the feasibility of creating trust by the more powerful customers in the automobile industry by taking initiatives to commit to a relationship before receiving assurances of trust from the weaker suppliers. On the contrary, suppliers, as a weaker partner, normally feel vulnerable to make a commitment without promised reciprocation from the stronger customer. It can be argued that this approach could be borrowed and applied in the Chinese context to promote a culture of trust between manufacturers and suppliers, as the former in China usually has overwhelmingly greater influential power than the latter. If manufacturers could be proactive and step out of the established comfort zone to promote the development of mutual trust, suppliers would have greater confidence in the relationship and less concerns about opportunism in the relationship. Satisfied with each other’s performance and benevolence, it is expected that manufacturers and suppliers would dedicate continuous effort to the relationship (Corsten and Kumar, 2005). Progressively, the low trust dynamics of the Chinese manufacturer-supplier relationship could be replaced by a high level of mutual trust which can facilitate openness to information sharing and realization of advanced SCC.
6.4.2.3 Power Asymmetry

Power asymmetry (see Figure 6.1) is the most crucial factor in manufacturer and supplier relationships. There have been contradictory arguments about the impact of power asymmetry on SCC. While some researchers consider that power asymmetry encourages opportunism, which allows manufacturers to take advantage of suppliers, and is hence harmful to collaboration (Benton and Maloni, 2005; Jonsson and Zineldin, 2003), many other scholars advocate that the presence of power asymmetry promotes SCC (Belaya et al., 2009; Crook and Combs, 2007; Maloni and Benton, 2000; Hingley, 2005; Zhao et al., 2008; Cox, 1999; Cox, 2004). However, a vast majority of scholars assert that the exploitative use of power has a negative effect on partner relationships and supplier performance (Benton and Maloni, 2005; Johnson et al., 1993; Gulati and Sytch, 2007; Handley and Benton Jr., 2012; Jonsson and Zineldin, 2003).

The interviewed managers of one of the Tier 1 suppliers disclosed that some leading manufacturers not only repeatedly coerced them to adjust processes and operations to meet their requirements but also demanded substantial price-cutting and unreasonable cost sharing. Having no choice, the supplier was forced to act opportunistically so that they would not lose money for the business. The opportunistic behaviours were later discovered and severely punished as the customer strictly monitored and controlled operations and product quality. Inevitably, the relationship between the manufacturer and the supplier ended up with dissatisfaction and termination. Bucklin and Sengupta (1993) point out that a coerced party may incline to seek possibilities to diminish its vulnerability, which may ultimately destroy the cooperation. Many other researchers also agree that the exercise of mediated power is very likely to have sizable negative effects on relationships, such as resentment, conflict, dissension, boycott and relationship termination (Munson et al., 1999; Jonsson and Zineldin, 2003; Benton and Maloni, 2005; Nyaga et al., 2013; Maloni and Benton, 2000; Handley and Benton Jr., 2012). This finding is consistent with SET, which stipulates that buyer and supplier reciprocate reward and punishment (Emerson, 1976). Even though powerful firms appear to gain some benefits initially, the overall value creation reduces with the use of coercion, and buyer and supplier are most likely to both result in a lose-lose situation (Johnson et al., 1993, Gulati and Sytch, 2007).

Historically, coercive tactics were adopted by the U.S. automotive industry to manage
buyer-supplier relationships, which consequently caused them to lose their competitive advantage to the Japanese rivals that preferred collaborative approaches (Cox, 1999). Over the past two decades, many U.S. firms have learned from their mistakes, and have started to employ relational tactics and take a long-term SC perspective to restore their competitive edge (Carter and Narasimhan, 1996). Thus, it is vital for Chinese manufacturers to avoid repeating the U.S. companies' mistakes, because the whole industry cannot afford to lose competitiveness in the age of globalization.

Nyaga et al. (2013) also suggest that coercive approaches should not be the choice for buyer-supplier relationships owing to the fact that such behaviours can be counterproductive. It is crucial for the Chinese manufacturers to understand the serious consequences of the exploitative use of mediated power. It is also imperative for them to reflect the power and dependency correctly, and use it in a more appropriate way so that a collaborative manufacturer-supplier relationship and win-win situation for both parties can be created for long-term success (Hansen and Rasmussen, 2013; Cox, 2004; Maloni and Benton, 2000). In power-imbalanced relationships, it is further underscored that modifications to power approaches must originate from the powerful party (Benton and Maloni, 2005; Griffith et al., 2006). It is necessary for the powerful manufacturers to build up social indebtedness and demonstrate justice first, therefore encouraging reciprocity from suppliers. In this way, willingness to share proprietary information and adaptation to integrated inter-organizational processes can be promoted. Ultimately, competitiveness in the global market can be engendered through real collaborative relationships.

6.4.3 Information Sharing

Information sharing (see Figure 6.1) is the key enabler of cross-organizational collaboration. Effective information sharing allows companies to lower transaction costs and risk, and engage in collaborative initiatives to outperform competitors. The purpose of this key element is to enhance the strategic information-sharing capability of manufacturers. The present research reveals that the Chinese manufacturing firms have neither sufficient, reliable SC connectivity along the SC, nor cultural willingness to share information with SC partners. The interviewed managers repeatedly mentioned that information cannot be shared with other departments due to the
existence of information silos. Information also cannot be shared due to the incompatibility of information systems between channel members. Most of the interviewed managers firmly believe that proprietary information could not be shared with others. Obviously, multiple obstacles exist, and these hinder the transmission of information among SC partners. In order to facilitate SC-wide collaboration, these obstacles have to be eliminated and turned instead into drivers. Wu et al. (2014) recommend that, when focal firms endeavour to implement collaborative paradigms, they should first develop IT infrastructure and IOS to enable effective communication. As such, manufacturing firms need to build up SC connectivity first so that SC members can be electronically linked. In the meantime, willingness to share information with SC partners has to be nurtured progressively to support the seamless exchange of large amounts of data between SC partners. Information-sharing capability has to be embedded across the SC to facilitate close coordination and alignment of business processes and strategies between SC members (Wu et al., 2006), so that it can be developed into a unique competitive advantage. Frohlich and Westbrook (2002) stresses that manufacturers should strive to enhance upstream and downstream e-integration whenever possible. Therefore, continuous effort has to be made by the Chinese manufacturers to strengthen their information-sharing capability.

While successful partnership is a prerequisite for information sharing, the improved level of information-sharing capability in turn enhances SC relationships. It is also a key facilitator of cross-organizational process integration. Such capability is indispensable to the realization of collaborative synchronization, as collecting, analysing and disseminating real-time and dynamic information among SC participants is essential.

### 6.4.3.1 Information Connectivity

Information connectivity (see Figure 6.1) is the technical foundation of information sharing. It serves as the nervous system of an SC, connecting partners electronically, thereby enabling real-time communication and orchestration of collaborative activities. This research indicates that the CMFs lack integrated information linkage with SC partners. Many issues associated with undesirable information connectivity were revealed by the senior managers interviewed. For instance, most of the manufacturers investigated took the lead to install sophisticated IOSs, but failed. Large amounts of
investment had been made in this regard. However, there were too many issues which had to be resolved before those investments could be capitalized. Most of the firms installed more than three different information systems that did not communicate with each other. Many IOSs were available on the market, but none of them was customized to individual manufacturer’s business operations. Even worse, all of them were very expensive and fell short of their advertised performance. The implementation process of the new information systems caused radical changes in the work of many employees, and created a large amount of extra workload, therefore leading to strong resistance among the employees to make changes. Although being confronted with all of the above challenges, however, IT managers still have to move ahead by solving problems slowly, as they know that sharing information is the right trend to follow.

Being unaware of the importance of information connectivity, most of the suppliers were unwilling to make heavy capital investment to get connected with their buyers. More importantly, they believed that, by using the traditional way of communication, their internal operation would not be invaded by powerful customers. As such, they were settled with outdated communication tools such as fax and telephone. It is hard to believe that some small-sized family suppliers do not have a computer and do not know how to use it at all. Clearly, an enormous amount of effort has to be made to improve SC-wide connectivity between the CMFs. Fawcett et al. (2007) suggests that manufacturing firms should try to avoid simply jumping into the trap of the technology bandwagon but choose the most suitable information systems for their own operations. Prior to implementation, IT managers need to improve their knowledge about available IOSs and enhance their managerial skill in implementing those systems. In this way, expensive investment in IT facilities would not be wasted, and the implementation and adaptation process would be less painful. Ye and Wang (2013) point out that, although Chinese manufacturers might be weak in IT implementation, integrated information systems do yield advantages for those firms, providing that information connectivity is successfully built up between SC partners. Hence, although enormous difficulties are yet to be overcome, CMFs need to continue building cross-organizational information connectivity so that the strategic value of information systems can be achieved in the near future.
6.4.3.2 Willingness to Share

Willingness to share information (see Figure 6.1) is a cultural driver for information sharing. Many scholars in the SCM discipline advocate that technology itself is insufficient for organizations to replicate the outstanding performance of the SC exemplars (Wu et al., 2006; Fawcett and Magnan, 2001; Constant et al., 1994). A high degree of willingness to share has to be cultivated to transform SC operations and processes for better performance and collaborative decision making.

The strong unwillingness of the CMFs to share information with SC partners is a major impedance to effective information sharing. A large amount of useful information is only shared between limited numbers of SC dominators. Many interviewed managers stated that accurate forecasting and planning information shared by international customers is largely withheld by focal manufacturing firms, rather than being passed on to upstream suppliers to facilitate better planning. Some domestic manufacturers even deliberately manipulate forecast and planning information to lure suppliers to produce more than necessary. Frequently suffering from opportunistic behaviours and unethical activities of suppliers, and being deeply concerned about information security, focal manufacturers thus strictly control their information flow and only share as little as possible with SC partners. On the other hand, perceiving information as a form of power, suppliers were reluctant to share information with focal manufacturers as well. They believed that, once valuable and sensitive information is leaked, they would lose their bargaining power and become vulnerable, therefore being disadvantaged.

Williamson (1988) argues that unwillingness to share information can minimize the benefits of investment in information technologies, given that critical information, such as on forecasting and planning, point of sale and inventory level, cannot be shared. While the CMFs are struggling to develop cross-organizational information connectivity between SC partners, cultural unwillingness to share would make the huge investment in various IOSs invalid. This circumstance seriously inhibits the implementation of integrated information systems among Chinese manufacturers, and presents a sizable hamper to the adoption of advanced SCC initiatives.

Fawcett et al. (2011) contend that a company’s technological connectivity, in conjunction with its cultural willingness to share, determines how effectively
information-sharing capability can be leveraged for business success. Many researchers consider that a culturally embedded willingness to share information can enlarge the value of physical connectivity by sharing an increased amount of real-time, high quality information (Lawrence and Lorsch, 1967; Lee et al., 2000; Mendelson, 2000). As such, it is vital for the Chinese manufacturers to alter their attitude towards information sharing, while making enormous investment in the adoption of information technologies.

To nurture a high degree of cultural willingness, increased training and resources need to be committed to improve awareness of the significance of a willingness to share and adopt proper organizational mechanisms, to promote information sharing between SC partners. Only when SC members understand the importance of a willingness to share, and start to exchange valuable information in a timely way with each other, can trust be gradually developed. Consequently, an increased amount of accurate and sensible information can be disseminated for collaborative decision making. SET stipulates that organizations are motivated to make more interactions when their behaviours are rewarded (Emerson, 1976). In addition, the more valuable to a member an exchange is, the more likely the member of the exchange is to perform the action again (Blau, 1964). Many scholars also ascertain that sharing high quality information with SC partners indicates trustworthiness and may promote partners to proactively participate in information sharing (Baihaqi and Sohal, 2012; Moberg et al., 2003, Li and Lin, 2006). With the imperative importance of information sharing to business success in the age of big data, the Chinese manufacturers need to have a clear understanding of the current undesirable situation of information sharing, and take initiatives without hesitation so that successful implementation of SCC can be made possible.

6.4 Process Integration

The main purpose of process integration (see Figure 6.1) is to simplify, standardize and streamline various SC processes to reduce cost, remove redundancy, and improve efficiency (Flynn et al., 2010; Kim, 2006; Swink et al., 2007; Wong et al., 2011; Daugherty et al., 1996; Chen et al., 2009b). Process integration is one of the prerequisites for achieving collaboration with SC partners (Mentzer et al., 2000; Barratt, 2004). It improves the level of performance significantly (Frohlich and Westbrook, 2001),
therefore making the realization of more advanced SCC possible. The goal of this key element is to develop the sophisticated process capability of manufacturers. Based on the observations of the manufacturing firms in the present study, many SC processes remain fragmented, being not effectively designed or efficiently coordinated, thus leading to many duplications and unnecessary steps. Different departments within a firm and multiple SC partners across the SC traditionally behave as functional silos and incline to optimize only their local subsystems. Many interviewed managers revealed that process integration became one of the major challenges for the achievement of SC synchronization, because of the extreme complexity of process rationalization, the involvement of too much information and relationships, and insufficient knowledge of SCM. Consequently, large amounts of effort and resources had to be deployed by the CMFs to promote process integration and therefore to pave the way for a high level of SCC. A seamless linkage between business processes and a smooth flow of materials and information has to be facilitated so that high efficiency can be achieved.

Process integration can only be engendered by the development of the three fundamental elements, namely strategic objective alignment, long-term partnerships and information integration. It is essential for the successful implementation of advanced SCC at the later stage.

Process integration is manifested in the following key aspects of business operations. Mature Lean and JIT manufacturing capability has to be developed to remove redundancies and inefficiencies. A formalized S&OP process has to be established to improve forecast accuracy and reach supply/demand maturity. VMI operation has to be standardized to improve overall SC performance and benefit both customers and suppliers. The distribution networks and processes have to be designed to reduce costs and improve responsiveness. Overall, this stage is to have basic organizational relationship capabilities and technological capabilities in place to make preparation for the most advanced collaborative synchronization.

6.4.4.1 Streamlined Lean/JIT Operation

With the alignment of common objectives between SC partners, the development of information-sharing capabilities, and the evolvement of partner relationships, basic process integration initiatives such as Lean/JIT (see Figure 6.1) become possible. The
objective of Lean/JIT initiatives is to eliminate all kinds of non-value-added activities except the minimum amount of resources that are absolutely essential to operations (Matsui, 2006; Shingo, 1985; Tucker and Davis, 1993; Womack & Jones, 1996). This is to seek continuous improvement in productivity, quality, flexibility and responsiveness to customer demand, through simplification of design, modularization of product, and standardization of components, production and processes (Hall, 1983; De Toni and Nassimbeni, 2000; Womack et al., 1990). Successful implementation of Lean/JIT is fundamental for the advancement of SCC.

According to the interviewed managers, Lean/JIT approaches have been adopted by their firms where they are deemed appropriate. The degree of maturity however varied depending on how much effort had been made by the different firms. However, a majority of them struggled to tackle numerous challenges during the implementation of the Lean/JIT approaches. Based on this finding, it is considered that continuous improvement in Lean/JIT capabilities is essential for CMFs to embark on SCM initiatives and move towards ultimate synchronization capabilities.

6.4.4.2 Formalized Sales and Operation Process

A formalized S&OP process (see Figure 6.1) is a solidified demand/supply balancing process with the support of executive sponsorship and the expanded ownership across the enterprise (Ball, 2015). It is a process to align SC with organizational strategy to drive the priorities and performances across the SC (Russell, 2015). According to the descriptions of the interviewed managers, no formalized S&OP process has been formed by the manufacturers, and their demand planning and forecasting capability is very weak. Basically, demand planning and forecasting activities are solely conducted by the marketing or sales department, and then are utilised by other departments within the organization. Offering of inaccurate planning information to suppliers by opportunistic focal manufacturers diminishes the value of inter-organizational planning activities. Due to a lack of IT facilities and POS data, and low visibility of inventories throughout the pipeline, forecasting was made mainly based on estimation or rule of thumb. Having no awareness of an SC perspective and a lack of knowledge of SCM, forecast accuracy was measured based on how many products were produced against how many were delivered to the next downstream SC members. Consequently,
reaching supply/demand balance had remained a difficult task for those interviewed manufacturers. Thus, the development of a formalized S&OP process is an essential step for CMFs to improve their basic supply/demand matching capability.

### 6.4.4.3 Standardized VMI Operation

VMI (see Figure 6.1) is to let the supplier manage the inventory replenishment process on behalf of the customer. It entails transferring both responsibility and authority of the whole replenishment process from the customer to the supplier (Kaipai et al., 2002). The aim is to reduce inventory costs through collaboration between the customer and the supplier, such as by sharing of real-time demand information, to make better replenishment decisions so that both parties could reap the benefits as a result of efficient operations. According to the interviewed managers, VMI has been widely employed by both domestic and international customers. However, it appears to be an approach that provides far more benefits to the customer than to the supplier. VMI is partially adopted by domestic focal manufacturing firms to push their own risk of inventory keeping to upstream suppliers. However, accurate demand data has never been shared by the manufacturers with the suppliers to enable more efficient replenishment. Consequently, the suppliers suffered from the increased costs as a result of more frequent transportation of goods and longer inventory holding time. Put simply, VMI is used by a customer to reduce its own inventory costs at the expense of the supplier, rather than to create the desired bilateral positive outcome; which is contradictory to the basic philosophy of VMI. Dong et al. (2007) argue that VMI is unlikely to succeed if the operation is not arranged for mutual benefit. Thus, it is necessary for CMFs to standardize VMI operation so that VMI is used for the improvement of the overall SC efficiency, favourable to both customer and supplier as anticipated.

### 6.4.4.4 Integrated Distribution Process

Integrated distribution process (see Figure 6.1) means physical coordination and integration of inbound and outbound delivery activities, such as transport, material handling and storage (Bennett and Klug, 2012), to reduce variability, eliminate non-value-added activities, and fulfil customer orders in a synergistic and cost-effective
manner (Frohlich and Westbrook, 2002; Treacy and Wiersema, 1993). In order to support the growing Omni-channel activities, direct-to-consumer fulfilments, and the Internet of Things (IoT), a more responsive and scalable distribution network and process has to be reengineered (Bond, 2015; Cunnane, 2013). Based on the on-site observations and the interviews with the managers, the present research finds that distribution processes of the CMFs are largely fragmented and undeveloped. Most of the interviewees considered that their distribution capability is very weak and that an upgrade to this capability is essential. Nevertheless, none of the interviewed manufacturing firms have commenced the design of a distribution network or the setting up of a distribution centre. Transportation of materials and goods is mainly contracted to 3PLs to cut costs. Apparently, a large amount of efforts and resources have to be allocated by CMFs to integrate distribution activities to achieve distribution excellence.

6.4.5 Collaborative Synchronization

Given the growth of Omni-channel fulfilment and B2B and B2C convergence, collaborative synchronization (see Figure 6.1) of supply and demand becomes the key capability that allows best-in-class corporations to stand out from their rivals. In essence, collaborative synchronization is to orchestrate all SC partners to operate in a mutually supportive, seamless and synergistic manner. It is the core and ultimate goal of SCC. The goal of this key element is to strive for ultimate advanced synchronization capability. Although this capability currently might seem hard to attain even by world-leading performers, and the majority of the CMFs are not adequately equipped or operationally prepared to gain such advanced capabilities, it is imperative for CMFs to follow global leaders’ footsteps and take initiatives to enhance their synergistic capabilities if they aim at becoming world-class manufacturers.

All the other four key elements, namely objective alignment, SC partnering, information sharing, and process integration, are prerequisites for the achievement of collaborative synchronization. Only if all the four other key capabilities have been evolved and improved to an advanced level, can realization of the collaborative synchronization be possible.

In this research, collaborative synchronization is manifested in four building blocks, which are end-to-end SC visibility, synergistic planning and forecast, optimized
inventory and distribution, and collaborative innovation.

### 6.4.5.1 End-to-End SC Visibility

End-to-end SC visibility (see Figure 6.1) refers to the automated real-time access to the specific information regarding the status of event, cost, and physical movements of orders and inventories across multi-tiered global supply-demand networks (Heaney, 2014). Gaining end-to-end SC visibility goes beyond basic track-and-trace capability. It requires a holistic view and granular control of information, so as to enable deep insight into specific situations that require agile responses to mitigate unexpected disruptions, eliminate waste or expedite delivery.

SC visibility is a prerequisite for the realization of collaborative synchronization. Full visibility into multiple-staged inventories throughout the chain would enable manufacturers to consolidate all inventory information then eliminate buffers and put all inventory into play, to satisfy demand effectively. Only if manufacturers have visibility into demand and supply plans would it be possible for all partners to work jointly on the agreed schedules, rather than operating independently, to sub-optimize the local performance. Having a single view of supply and demand is the foundation for synchronization of SC activities collaboratively between all partners.

### 6.4.5.2 Synergistic Planning and Forecasting

Synergistic planning and forecasting (see Figure 6.1) moves beyond the basic demand/supply balance. It advances the basic S&OP process to become ‘the one plan for the business, the point of direction, and a predictive process model that drives priorities and performance’ (Ball, 2015, p. 2). Instead of looking at forecasting algorithms only, a more comprehensive process has to be performed to form a sound demand statement, measure accuracy, retain constant vigilance over divergences, and take corrective actions immediately. The basic S&OP process intends to be predictive and aggressive since it requires the organization to provide satisfied customer service using the most profitable method. At this stage, close internal and external collaboration is essential.

SPF can be manifested in multiple more advanced capabilities. For instance, it requires
the ability to incorporate promotion and other demand-shaping activities, and to manage the business in a more prescriptive manner (Ball, 2012). It also requires the ability to optimize product portfolios, inventory and service levels from multiple perspectives, and to incorporate profit optimization into the decision process. The ability to conduct unconstrained and constrained scenario planning to maximize the utilization of all assets and eliminate fire-fighting is also needed. Similarly, the ability to sense channel demand by leveraging the existing data affecting current volatility in a timely and scalable manner, to improve very near-term forecasts (Cecere, 2014; Aberdeen Group, 2013; Kahn et al., 2006) is necessary. SPF also demands the ability to apply advanced analytics to facilitate intelligent responses, so that more future-looking suggestions and insights can be provided for decision making (Heaney, 2015).

6.4.5.3 Optimized Inventory

Proper optimization of inventory (see Figure 6.1) levels with volatile channel patterns to meet anticipated service level is critical for manufacturers involved in the emerging Omni-channel environment. Inventory optimization can be defined as allocating the right amount of inventory across channels in a predictive manner by using analytics and managing various constraints while achieving service level targets. Inventory optimization needs better understanding of the trade-offs between inventory deployment and service level. Normally, it involves improvement in inventory modelling, safety stock setting at critical nodes, and inventory mix (Ball, 2014). It also needs to rapidly identify channel shifts, and fine-tune stocking policies, throughout the network. It requires adoption of a sophisticated, multi-echeloned approach, to determine inventory levels methodically and diminish the “rule of thumb” buffers.

6.4.5.4 Collaborative Innovation

Collaborative innovation (see Figure 6.1) means the introduction of new technologies for the development of new products, through joint learning and innovative activities between SC partners. It is deemed as a source of competitive edge owing to the possible substantial merits, such as reduced cost, improved design and quality, increased value to customer, and enhanced timeliness of products (Azadegan et al., 2008; Koufteros et al., 2005; Clark, 1989). The practice has been increasingly adopted by manufacturers to leverage SC partners’ technological and innovative capabilities
As it is well acknowledged, products made in China mainly feature low technology and limited added-value features for customers. Consequently, it is hard for the CMFs to differentiate their products from competitors. Being challenged by intensified competition and global economic turmoil, CMFs are competing at cost, and struggling for survival. According to the interviewed managers, they have realized the vital importance of collaborative innovation and have engaged in a variety of joint innovative activities with SC partners. However, these joint efforts are mainly confined to simple problem solving and the involvement of SC partners in NPD initiatives. This is far from sufficient if the upgrade of the technological and innovative capabilities of the whole manufacturing industry is anticipated. More extensive and constant collaborative learning activities, such as regular training, concurrent engineering, and SD initiatives, have to be organized to transfer knowledge internally and externally. Ultimately, this effort will enable the building up of a solid knowledge and technology foundation accumulatively, to enable a sustainable development and modernization of the whole manufacturing industry.

6.5 Chapter Summary

This chapter has provided an extensive discussion of the research findings. The main characteristics of SCC in the Chinese E & E manufacturing industry have been described. The key elements of and major barriers to SCC in China have also been highlighted. The findings corroborate all four theoretical paradigms used in the research, and reveal that the environment and process of SCC in China is not identical to that of the developed economies. This chapter also develops a capability-based strategic framework of SCC in China to facilitate the development of the SCC capability of CMFs. A detailed explanation of the inter-relationships between each construct in the framework is given. The next chapter will present conclusions for this thesis.
CHAPTER 7 Conclusion and Implications

This chapter draws conclusion from the research. It then discusses the important contributions of this study from both the theoretical and managerial perspectives. Finally, it points out the limitations of the study and suggests future directions for further research in this field.

7.1 Conclusion

SCC is constantly promoted and strongly advocated by the leading SC performers in the world. How SCC is adopted by the Chinese manufacturing industry has, however, remained unknown. Borrowing insights from AT, SET, ERBV and Institutional Theory, this research examines how effectively SCC is being implemented by Chinese E & E manufacturing firms. A multiple-case study approach has been employed to collect information from chosen manufacturers and suppliers for in-depth analysis.

Through evaluating the common themes and practices revealed in the multiple interviews with senior managers from four leading manufacturing firms currently engaged in cross-organizational collaboration, five key elements of and seven major barriers to the achievement of SCC have been identified. Based on the analysis of research findings, a capability-based strategic framework incorporating the unique characteristics of the SCC among the CMFs has been proposed. The framework can serve as a guide for Chinese manufacturers aiming to implement SCC, to carry out necessary and appropriate improvement in collaborative capabilities.

Results from this study suggest that the successful implementation of SCC will likely remain elusive to Chinese E & E manufacturing firms until all major barriers that impede advanced SCC are overcome and all key capabilities are gradually enhanced. The findings of this research support the use of the above-mentioned four theories.

According to the research findings, it can be argued that the journey to the successful implementation of SCC by CMFs will be a long one, as building of key capabilities and elimination of major barriers cannot be achieved in a short-run. Firstly, the evolvement of key capabilities, from the current very basic level to an advanced level, requires considerable effort and a large amount of resources. Secondly, the development of a
high level of trust between SC partners in an institutional environment such as China is challenging. Thirdly, significant power asymmetry is culturally embedded and very difficult to change. Lastly, the unique institutional environment in China might take a very long time to change and be regulated to become favourable for the advancement of SCC capabilities. In essence, the transitioning from existing superficial partnerships, low information-sharing capability, and weak organizational capability, towards an extensive collaboration between SC partners, can be a substantial challenge for Chinese manufacturers.

In the next section, contributions of this research from both the theoretical and the managerial perspectives will be discussed.

7.2 Theoretical Implications

The results from the present study have some important theoretical implications. Firstly, it provides a holistic view of the state-of-the-art of SCC practices of the Chinese E & E manufacturing firms. The existing literature on SCC initiatives of CMFs is incomprehensive, and mainly focuses on certain aspects of the collaborative actions. To explore how SCC can be successfully adopted and implemented by the CMFs, it is essential to portray a broader picture of the current collaborative practices of CMFs. This research incorporates five key elements of and seven major obstacles to successful SCC from both the manufacturers’ and the suppliers’ perspectives. It thus offers a better understanding about the unique collaborative behaviours of CMFs. The findings of this research present systematically gathered empirical evidence to support the increasing implementation of SCC by CMFs.

Secondly, the present study highlights the complementary roles of AT, SET, ERBV and Institutional Theory in the examination of the complex nature of SCC. AT explains inter-organizational activities from an economic perspective, while SET provides a social point of view. ERBV complements AT and SET by taking the resources, capabilities and competencies of SC partners into consideration. By evaluating the impact of institutional environment on the adoption of collaborative practices, Institutional Theory offers an alternative viewpoint in managing supply chains. The present study is the first attempt to investigate SCC from four different perspectives. This research echoes
Halldorsson et al. (2007), who claim that several theories can be used in a complementary manner to provide a more comprehensive explanation of phenomena in SCM. The four theories selected in the present research are well supported by empirical evidence collected from the Chinese E & E manufacturing firms.

Thirdly, the present research investigates the collaborative initiatives of the CMFs from both the manufacturers’ and the suppliers’ perspectives. Although SCC initiatives are designed to improve the overall efficiency of all firms throughout the chain, manufacturers and suppliers generally hold different views of SCC, given that the benefits and risks are not evenly distributed. This study has examined the collaborative activities taking the interests of both parties into account.

Fourthly, the present study also makes comparison of collaborative activities between international and domestic focal manufacturing firms. The research findings reveal the significant differences in the same collaborative initiative as employed by international and domestic manufacturers. Hence, the present research points out the right direction for the CMFs to adjust their SCC implementation approaches so as to enhance their chances of success.

Furthermore, this study develops a capability-based strategic framework to enable manufacturers to evolve their SCC through the enhancement of collaborative capabilities. Existing frameworks of SCC identified in the literature are generally established based on the analysis of practices in developed countries. They tend to assume that all key capabilities essential for successful SCC have already been well established. However, the institutional situation in many emerging economies, such as China, is very different. In order to explore how collaborative capabilities can be improved by the CMFs to enhance their competitiveness in the global market, a holistic framework of SCC incorporating resources and competencies incorporating economic, social, and institutional factors is considered indispensable.

Lastly, the capability-based strategic framework can be used by manufacturers as a guide to improve collaborative capabilities by allocating resources to the development of key elements and the gradual removal of major barriers. It might also be used by manufacturers in other emerging economies such as India, Vietnam, and Indonesia to improve their SCC capabilities.
7.3 Managerial Implications

The evidence gathered in this study has several managerial implications for manufacturers and the government. Firstly, it suggests that partial imitation of successful Western collaborative practices for short-term gain can actually lead to negative impacts on partner relationships and SC performance. SC managers, particularly in focal manufacturing firms, should understand that the aim of SCC is in fact to enhance the competitiveness of the entire SC in the long run through joint efforts between SC members. Partial imitation of the standard SCC practices to maximize short-term benefits at the expense of the weaker SC partners and overall SC efficiency can undermine the competitive advantage of the entire supply chain. This kind of inward looking parochial approach to SCC would only result in a lose-lose situation for all SC members.

Secondly, consistent with prior studies, the findings indicate that executive sponsorship is critical to the successful implementation of SCC. This suggests that executives of manufacturing firms should be aware that their involvement in all important SC decision making can play a key role in the success of collaborative practices. Their involvement is also crucial for the development of organizational capabilities in terms of alignment of SC objectives, improvement of knowledge of SCC through training provided to employees and suppliers, and better understanding about the importance of close internal and external collaboration to business success. Without continuous and strong executive sponsorship, achievement of advanced collaboration would be difficult.

Thirdly, like the situation in many Western countries, superficial partnerships are typical among the Chinese SC partners as well. Manufacturers should realize that a superficial partnership is adversarial by nature. With a superficial partnership, local profit maximization remains the focus of organizations. Collaborative competitive edge would thus not be generated, since it requires enormous collaborative endeavours in proper incentive alignment, continuous supplier development, cultivation of a high level of trust, and appropriate management of power asymmetry. Managers should put more effort into these aspects so that true partnership embedded with a high level of trust can be nurtured.

Fourthly, the findings of this research indicate that the information-sharing capability of
the CMFs has yet to be developed. This is mainly due to lack of information systems and the strong unwillingness to share information with SC partners. The value of effective information systems might not be fully realized by the manufacturers, as they still rely on traditional approaches to exchanging information. For the suppliers, many of them refuse to adopt information systems due to additional costs and computer illiteracy. Hence, managers should learn more about the importance of information sharing to organizational efficiency and competitiveness. Increased investment should be made to adopt or upgrade information systems so as to facilitate internal and external real-time information transmission. At the same time, managers should also be aware that the investment in information systems can only be capitalized through effective information sharing for better decision making. Therefore, they should change their mind-set and manage to share more information with SC partners rather than hinder information exchange or take advantage of weaker parties. The development of trust is also essential for the improvement of an information-sharing capability.

Furthermore, this study demonstrates that institutional factors have significant impacts on the implementation of SCC by the Chinese firms. This result coincides with that of Liu et al. (2010), who contend that different dimensions of institutional pressures have direct effects on the adoption of SCM initiatives. Managers need to recognize that even the most successful Western SCC practices might not be completely applicable in the Chinese context, owing to complex institutional pressures. It is a challenge for manufacturers to implant best practices rooted in developed countries. Not only do they need to adapt strategically to the domestic institutional forces, which are not particularly favourable to SCC, but they also need to consider the benefits of the entire supply chain in the long run.

Lastly, the findings of this study show that government effort and innovation play vital roles in shaping the institutional environment. To facilitate a desirable institutional situation to promote close collaboration and enhance competitiveness of the manufacturing industry, government effort and innovation on the following dimensions would be promoted or supported through incentives. Firstly, the government could adopt sustainable and favourable industry policies to ensure the continuous and stable development of the manufacturing industry. Secondly, the government could impose regulations and enhance the enforcement of legitimate policies to reduce opportunistic behaviours, protect intellectual properties, safeguard information security, and
encourage healthy competition. Thirdly, the government could also introduce incentives, recognition and rewards for practices which help transform the business culture in China to one that fosters inter-firm mutual trust. In time, these initiatives, together with the continuous collaborative engagement of manufacturing firms and the government, may nurture an advantageous institutional condition to promote collaboration and generate a competitive edge for CMFs.

7.4 Limitations of the Study

Despite the various theoretical and managerial implications derived from the findings, conclusions reached in this research should be viewed with caution due to certain limitations of the study. Firstly, lack of external validity is the major weakness of case study research in general. This critique is also applicable to the present research.

Secondly, this research has predominantly focused on only one sector of a particular industry. While it has provided valuable insights into the collaborative capabilities of the Chinese E & E manufacturing firms, the findings might not be completely applicable to reflect the behaviour of the entire manufacturing industry in China.

Thirdly, this study developed a comprehensive framework based upon four widely adopted theories in the SCM field, namely AT, SET, ERBV and Institutional Theory, other theoretical lens, such as the RV, may also provide a valid explanation of the collaborative behaviours between manufacturers and suppliers. RV argues that a pair or a network of firms can generate relational rents through asset specialization, knowledge-transferring mechanisms, complementary resource endowments, and effective governance (Dyer and Singh, 1998). These are some of the collaborative efforts that have been employed by the CMFs, although others were not widely observed in the present study, probably due to the nascent stage of SCC in China.

Another limitation exists with respect to the proposed framework for SCC. Whilst it provides a theoretical foundation and important implications for manufacturing corporations and the government in China, it has yet to be tested using empirical data collected across multiple industries and regions.

Lastly, institutional barriers to extensive collaboration between corporations in one
country might not be applicable to others owing to different socio-institutional and cultural settings. Thus, there is a limitation to the extent to which the research outcomes of the present study can be generalized. In this regard, a comparative research analysing the SCC practices in different developing countries would be valuable.

7.5 Directions for Future Research

One possible future avenue of investigation is to incorporate cases from a wider variety of manufacturing industries in different regions of China. Engaging more manufacturers from different types of industry, such as automotive, manufacturing and processing machinery, and consumer goods industries, can further test the generalizability of the research findings. The characteristics of SCC of different industries in different regions might vary due to different SC settings and specific industry features.

Future research could also pay more attention to the collaborative activities of manufacturing firms of different ownership types. Manufacturing firms in China have different ownership types such as state-owned, joint-venture, foreign-owned and private-owned firms. The way they collaborate with their SC partners could also be different across ownership types. In particular, foreign-owned manufacturing firms from Japan or Western countries tend to be very sophisticated in SCC initiatives. Their collaboration with Chinese suppliers might be more mature.

Furthermore, future research could examine the SCC initiatives of manufacturing firms by involving more business partners across the SC such as retailers and sub-tier suppliers. They all play important roles in the success of the collaborative initiatives of the focal manufacturing firms. On the one hand, retailers are close to customers, thereby having a deep insight into any behavioural changes and variations in demand. On the other hand, sub-tier suppliers are often vital to the avoidance of supply disruptions. Incorporating viewpoints of retailers and sub-tier suppliers could therefore enhance the effectiveness of collaborative efforts significantly.

In addition, future research could investigate collaborative endeavours of manufacturing firms by incorporating a Relational Perspective. Relational Perspective can be employed to explain how a firm can improve quality, efficiency and productivity through creating inter-firm specific assets. This perspective can also be embraced to
elucidate how inter-firm knowledge-sharing routines can be leveraged to create mutual benefits. Furthermore, this perspective can be adopted to describe how complementary resource endowments of alliance partners can be used to generate greater idiosyncratic competitive advantages. Lastly, Relational Perspective emphasizes that effective governance minimizes transaction costs, thereby improving efficiency. All of the above four sources of relational rents can only be realized through synchronized SCC.

Finally, another direction for research is to investigate collaborative behaviours of the entire manufacturing industry using a quantitative approach or a mixed method. A survey-based research could be conducted to examine the level of SCC between manufacturing firms and their SC partners throughout the nation. Hence, the generalization of the present research findings could be further verified.

7.6 Chapter Summary

With an aim to leverage SCC to enhance competitive edge of CMFs, this thesis explores how effectively supply chain collaboration is being implemented in China. A multiple-case study approach is employed to investigate the collaborative behaviour of four leading Chinese E & E manufacturing firms. In addition to depicting the main characteristics of SCC in China, the study has helped identify five key elements of as well as seven major barriers to the successful SCC implementation. The findings indicate that multiple Western SCC practices are being implemented by the Chinese E & E manufacturing firms. However, they are not adopted in whole but are partially imitated by the firms for maximization of their own short-term benefits at the expense of the overall SC performance and efficiencies. The conclusion of this study is that successful implementation of SCC is likely to remain elusive to Chinese E & E manufacturing firms until all major barriers impeding advanced SCC have been overcome and all key capabilities been gradually enhanced. Based on the findings, a capability-based strategic framework is proposed to enable manufacturers to evolve their SCC through the enhancement of collaborative capabilities. This chapter completes the thesis by discussing the theoretical and the managerial implications of the research findings. It also points out the limitations of the study and suggests certain directions for future research.
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Appendix A: Interview Protocol

A. Introduction to the Case Study
   1. **Research Questions**
      a) What is the state-of-the-art of SCC implementation by the Chinese E & E manufacturers?
      b) What are the key elements of and major barriers to SCC of the Chinese E & E manufacturers?
      c) What strategies can be formulated to advance SCC among the Chinese E & E manufacturers?

B. Data Collection Procedures
   1. **Name of the manufacturing firm:**
      Contact person:
      Phone No.:
      Address:
   2. **Data collection plan**
      a) Type of data: interview record, field note, documents
      b) Data collection procedure:
         1) Chief Executive Manager
         2) Marketing Manager
         3) Supply Chain Manager
         4) Purchasing Manager
         5) Production Manager
         6) Logistics/Transportation Manager
         7) Warehouse Manager

C. Case Study Questions
   1. **Elements of Supply Chain Collaboration**
      a) **Objective Alignment**
         Q1: In which aspects do you and your supply chain partners set common objectives?
         Q2: How do you measure the performance of your supply chain partners? What performance metrics are used to measure the collaborative effort of the supply chain partners?
         Q3: What financial incentives and penalties are used to encourage collaborative effort?
         Q4: Are there protocol for security and protection of confidential information shared among supply chain partners?
         Q5: How do you promote internal and external collaboration?
b) Information Sharing

Q1: How do you share information with customers and suppliers? What types of information do you share with them respectively?

Q2: How frequent is the shared information updated?

Q3: What is the quality of the information shared?

Q4: Please describe how information technology is used to facilitate information sharing.

Q5: What are the most important factors facilitating or inhibiting effective information sharing?

c) Integrated supply chain processes

Q1: What is your customer relationship management policy? What is your supplier relationship management policy?

Q2: Please describe your order fulfilment process.

Q3: Please describe your production management method.

Q4: Please describe your logistics distribution process. How do you design your distribution network?

Q5: Please describe your warehouse management method.

d) Collaborative Synchronization

Q1: What kind of issues on which collaborative decisions are made between you and your supply chain partners?

Q2: What are the aspects in which collaborative planning is carried out between you and your supply chain partners?

Q3: How do you forecast sales collaboratively? How accurate is the sales forecast in general? How do you improve it? What are the exception criteria for sales forecast? How do you generate new orders? What are the exception criteria for order forecast?

Q4: How do you replenish collaboratively with customers and suppliers? What is your inventory policy? How do you maintain an optimal inventory level?

e) Collaborative investment and innovation

Q1: What kind of investments have you made on your suppliers in terms of technology, people and money?

Q2: What kind of training do you provide to your suppliers? How do you solve problem collaboratively with retailers and suppliers?

Q3: How do you invite retailers or suppliers to participate in the new product development process?

Q4: What other key elements do you think are important to supply chain
collaboration?

2. Institutional Barriers to Supply Chain Collaboration

Q1: In your opinion, what are the major institutional barriers to supply chain collaboration?

Q2: Please describe how transactional relationship hinders supply chain collaboration? Why? How can this barrier be removed?

Q3: Please describe how inter-organizational system technology hampers supply chain collaboration? Why? How can this barrier be removed?

Q4: Please describe how inefficiency of third-party logistics service providers hinders collaboration? Why? How can this barrier be removed?

Q5: Please describe how institutional environment inhibits collaboration. Why? How can this barrier be removed?

3. Benefits of Supply Chain Collaboration and How to Overcome All Those Barriers and Improve Supply Chain Collaboration

Q1: What are the benefits of supply chain collaboration for your company?

Q2: In your opinion, how can the above-mentioned barriers be removed or overcome to improve supply chain collaboration capability of the manufacturing firms in China?

4. Company Information

a) Organization type

b) Annual sales volume of your company

c) Number of employees in your company

d) Main products

e) Major markets