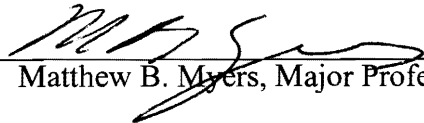
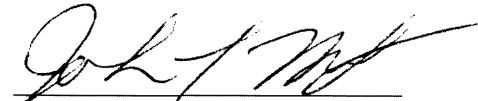


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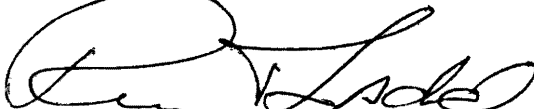
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Matthew B. Myers, Major Professor

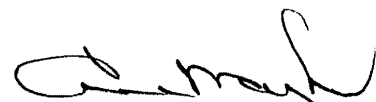
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**INTER-FIRM KNOWLEDGE SHARING  
AND ITS EFFECT ON RELATIONSHIP VALUE:  
A GLOBAL SUPPLY CHAIN PERSPECTIVE**

**A Dissertation  
Presented for the  
Doctor of Philosophy  
Degree  
The University of Tennessee, Knoxville**

**Mee-Shew Cheung  
August 2005**

Thesis  
2005b  
.2548

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## **DEDICATION**

**To Tien Ser, Gabriel and Gracia**

*When dreams take flight, follow them.....*

## **ACKNOWLEDGMENTS**

There are many people whose contribution to this research I would like to acknowledge. The guidance and encouragement from the Marketing and Logistics Department faculty have been invaluable throughout my entire doctoral experience. I owe a great deal of gratitude to my committee members, Dr. Matthew B. Myers, Dr. John T. Mentzer, Dr. Daniel J. Flint, and Dr. Robert T. Ladd for giving their time and energy throughout this process. Special thanks go to Dr. Matthew B. Myers for his encouragement and counsel from the very first day of the program, and for being a role model in so many ways. I am especially grateful to Dr. John T. Mentzer and Dr. Richard C. Reizenstein for providing me with their valuable business contacts in my data collection exercise. Through their support, coupled with the research grants from the College of Business, and the Integrated Value Chain Forum at the University of Tennessee, this study was completed in a timely fashion.

I would like to express my sincere appreciation to the companies who gave of their time and resources to assist in this research.

Finally, I would like to express my deepest gratitude to my parents and family in Singapore for supporting my decision to pursue an entirely new path in life.

God moves people in and out of our lives, and each leaves his/her mark on the other. We realize we are made up of bits and pieces of all with whom we come into contact, and we are more because of them.

## **ABSTRACT**

Learning theories play a prominent role in new theories of competitive advantage. Despite the recent progress in understanding interorganizational learning (inter-firm knowledge sharing), gaps and shortcomings remain. Inter-firm knowledge sharing involves risks and dilemma. Little is known about the characteristics of global supply chain design that would encourage inter-firm knowledge sharing, and how these collaborative activities could lead to improving the long-term performance of the individual companies and the supply chain as a whole. Furthermore, previous studies on inter-firm collaboration mainly looked at operational efficiency as the key performance measurement. Relationship value should be taken as a more critical criterion variable when firms are driven by more demanding customers, global competition, and slow-growth economies. Building from the resource-based view, transaction cost economics, relational exchange view, and political economy paradigm, this study seeks to provide insight to how firms commit their resources to engage in knowledge sharing activities with their overseas supply chain partners, and the implications on horizontal (i.e., cross-border) segmentation pertaining to firms' sourcing and marketing strategy.

Using the extant literature from the fields of marketing, supply chain management, and international business, a theoretical model was constructed and then tested through a Web survey involving 105 supply chain dyads (210 responses) from 4 manufacturers representing 3 industries with facilities located in 19 countries. The survey data were analyzed using structural equation modeling to simultaneously test the 8 hypotheses.

Both the buyers and the sellers in this study shared the consensus that environmental uncertainty, environmental fit, organizational fit, and idiosyncratic investments facilitate inter-firm knowledge sharing in spite of the risks and dilemma associated with such activities.

Both sides of the dyad also found the investments in such activities worthwhile, when outcomes were measured by relationship value, explored from the perspectives of both the buyers and the sellers.

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# **CHAPTER ONE**

## **INTRODUCTION**

### **PROBLEM STATEMENT**

The marketing environment in this new century promises to be knowledge rich and highly turbulent (Achrol 1997). Firms operating in today's highly competitive environments are confronted with the fundamental question on how to achieve and sustain competitive advantage. Day and Montgomery (1999) identify five specific issues contributing to market competitiveness: the importance of knowledge; globalization, convergence, and consolidation of business and industries; fragmentation of markets; empowerment of customers; and adaptation of organizations. They also suggest that these issues challenge academic marketing to provide meaningful measures, inferences, and calibration; understand functional interfaces; and rethink the role of theory (Day & Montgomery 1999).

Changes in technology and globalization of products and services have also resulted in increasingly dynamic markets and greater uncertainty in customer demand. Customers are better informed, have greater access to a wider choice of goods and services, and have access to new products emerging at a faster pace. Thus, a firm's competitive position depends on its ability to understand changes in customer demands and respond appropriately with offers that will meet those demands (Butz and Goodstein 1996; Flint, Woodruff and Gardial 2002).

As Selnes and Sallies (2003) observe, learning theories have a prominent role in new theories on competitive advantage (Baker and Sinkula 1999; Day 1994a, b; Dickson

1992; Hurley and Hult 1998; Sinkula 1994). Learning has been approached not only as an organizational phenomenon but also as an *interorganizational* phenomenon (Larsson, Bengtsson, Henriksson and Sparks 1998; Levinson and Asahi 1995; Powell, Koput and Smith-Doerr 1996;). The relational view of developing a competitive advantage identifies inter-firm knowledge sharing as an important avenue for creating differential advantages and “supernormal” profits in relationships (Adams, Day and Dougherty 1998; Dyer and Singh 1998; Pine, Peppers and Rogers 1995). In customer-supplier relationships, better knowledge of customers enables suppliers to provide and develop more valuable products. With better knowledge of suppliers, customers are better able to choose products and develop solutions that satisfy their own needs and wants (Selnes and Sallis 2003, p. 80). Thus, it is argued that supply chain activities offer a greater source for value-added benefits to customers than the value added by other marketing functions (Fuller, O’Conor, and Rawlinson 1993; Weitz and Jap 1995).

As firms expand their geographic scope of operations, one of the objectives that firms must consider in global strategy is that of innovation, learning and adaptation (Ghoshal 1987). The usual view of comparative advantage is limited to factors that an economist admits into the production function, such as the cost of labor and capital. However, Ghoshal (1987) suggests that from a managerial perspective, it may be more appropriate to take a broader view of societal comparative advantages to include resources such as inter-organizational linkages, the nature of a nation’s educational system, and organizational and managerial know-how. As argued by Westney (1985), these factors, if absorbed in the overall organizational system, can provide benefits as real

to a multinational as those provided by such economic factors as cheap labor or low-cost capital.

The progress of product improvement, technological advancement and innovation does not occur in all countries at the same time and at the same rate. As such, one country may have short-term advantages in knowledge specific to one industry or product over their rivals from other countries (Posner 1978). Audretsch (2003) shares the same view on how globalization has shifted the comparative advantage in many countries away from being based on traditional inputs of product (such as land, labor, and capital) towards knowledge. Simply put, inter-firm knowledge sharing with *cross-border* partners further enhances firms' competitiveness.

Several research studies have been conducted in an effort to understand how strategic outcomes are achieved in buyer-seller relationship learning and collaboration contexts (see Jap 1999; Selnes and Sallies 2003). However, many important questions on how to apply value-based strategies in a global supply chain context still need to be addressed.

Collaboration between firms has become very popular in recent years, but has also been characterized by a high level of dissatisfaction with the actual outcomes relative to expectations and, correspondingly, a high rate of failure (Dodgson 1993; Hennart, Kim and Zeng 1998; Parkhe 1991). The high failure rate suggests that even when potential synergies are present, firms face substantial difficulties in attaining them (Madhok and Tallman 1998). Previous research also points out a number of risks and dilemma associated with knowledge sharing in inter-firm or network settings.

The first dilemma is how to motivate self-interested network members to openly share valuable knowledge with other network members (Wood and Gray 1991). The natural tendency of individual firms is to protect proprietary know-how to prevent undesirable spillovers. Consequently, many firms (especially those with proprietary know-how) will be reluctant to participate in inter-firm knowledge-sharing activities. The knowledge that is most likely to be valuable to other firms in the network is often exactly the kind of knowledge that individual firms want to keep proprietary (Dyer and Nobeoka 2000).

The next dilemma relates to the free-rider problem. This is often discussed in the collective action theories that examine the challenges associated with achieving collaboration toward common goals among self-interested individuals, groups, or organizations (Marwell and Oliver 1993; Sandler 1992). Successful collaboration may produce 'collective' or 'public' goods (knowledge) that are accessible to members of the network. However, the creation of a public good such as useful knowledge, has the potential for 'free-riders'. These are members who enjoy the benefits of the collective good without contributing to its establishment and/or maintenance (Dyer & Nobeoka 2000).

Individual companies tend to be wary of getting too close to one another for fear of losing control, compromising trade secrets, proprietary information and even losing revenue and competitive edge. Often the focal firm likes to work with a set of permanent partners with whom they can develop close information connections. However, as the firm narrows down its range of partners, there is a concern that the balance of power will shift to the supplier. Gulati, Nohria and Zaheer (2000) agree that networks have a

potential dark side and may lock firms into unproductive relationships or preclude partnering with other viable firms. In this way, a firm's network of relationships is a source of both opportunities and constraints.

Despite the recent progress in understanding interorganizational collaboration (see Jap 1999; Selnes and Sallies 2003), gaps and shortcomings remain. Inter-firm knowledge sharing involves risks and dilemma. Little is known, for example, about the characteristics of global supply chain design that would encourage inter-firm knowledge sharing and how these collaborative activities could lead to "improving the long-term performance of the individual companies and the supply chain as a whole" (Mentzer, Min and Zacharia 2000). Although collaborative relationships are becoming increasingly important in today's business environment, they are not appropriate for every market or customer. As Day (1994) observes, some customers want nothing more than a competitive price and the timely exchange of the product or service with minimum hassle. Furthermore, due to the requirement of a large amount of effort and resources to support a tightly linked relationship, it may not be practical for a firm to do this with more than a few critical customers or suppliers. In short, is inter-firm knowledge sharing always *mutually* beneficial to the parties involved?

Previous studies on inter-firm collaboration mainly looked at *operational efficiency* as the key performance measurement (Anderson and Narus 1990; Cannon and Perreault 1999; Ellram 1990, 1991; Magrath and Hardy 1994). This study expands the scope of performance measurement on inter-firm knowledge sharing and explores the effect of inter-firm knowledge sharing on *relationship value*.

As Woodruff (1997) observes, firms are driven by more demanding customers, global competition, and slow-growth economies, to search for new ways to achieve and retain a competitive advantage. Past attempts have largely looked *internally* within the organization for quality management and operational efficiency. These efforts brought important performance improvements (Garvin 1983; Leonard and Sasser 1982), however, they reinforced an internal orientation (Woodruff, 1997).

Managers have since been implored to consider their customers when determining which improvements are needed, and customer satisfaction measurement has emerged to bring the “voice of the customer” into the quality effort (Woodruff 1997). However, if customer satisfaction measurement is not backed up with in-depth learning (knowledge) about customer value and related problems that underlie their evaluations, it may not provide enough of the customer’s voice to guide managers in how to respond.

In forming collaborative relationships with select trade partners, firms are forced to wrestle with difficult questions about which partner to select and how to manage the relationship once the partner has been chosen. Answering these questions demands the understanding on the way collaborative relationships generate value for both the customers and the suppliers.

Research in supply chain management has received a great deal of attention and has risen to prominence over the past decade (Cooper, Ellram, Gardner, and Hanks 1997). However, research to *global* supply chain management has been scant (See Table 1.1). The gaps in research therefore present opportunities for further study in this important area.

**Table 1.1 Comparison of Our Current Study with Previous Related Research**

| <b>Problem Studied</b>                                    | <b>Exemplar Studies</b>                  | <b>Comparative/ Global studies</b> | <b>Findings</b>                                                                                                                                                                                                                                                                                                           | <b>Comments</b>                                                                                           |
|-----------------------------------------------------------|------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Relationship between SCM and the Japanese Keiretsu system | Ellram & Cooper, 1993                    | Yes                                | Noted differences in the cultural roots and national legal systems which make the interlinkage of companies in Japan more effective than in the U.S.                                                                                                                                                                      | Not directly dealing with managing global supply chain.                                                   |
| Status of SCM in Argentina's food industry                | Chiappe & Herrero, 1997                  | Yes                                | Noted the shift from a period of high inflation (which led to a mind-set that high levels of inventory are good) to a more stable economic environment led to an increasing need for "state of the art" supply chain process.                                                                                             | Not directly dealing with managing global supply chain.                                                   |
| Issues important in global SCM                            | Houlihan, 1985                           | Yes                                | Noted that transfer pricing, divisional or geographic autonomy, local systems and standards, and incompatible operating systems create problems in an international context.                                                                                                                                              | Does not provide additional insights regarding the influence of those variables on global SCM.            |
| Variables unique to global SCM                            | Arntzen, Brown, Harrison & Traffon, 1995 | Yes                                | Using the authors' Global Supply Chain Model (GSCM) which highlighted a number of variables unique to global SCM (such as costs, production and distribution time etc.) , Digital Equipment Corporation, over a two-year period, managed to achieve tremendous reduction in both manufacturing costs and logistics costs. | The optimum configuration for DEC's supply chain operations was found to be regional, rather than global. |

**Table 1.1 Continued**

| <b>Problem Studied</b>                                                                        | <b>Exemplar Studies</b> | <b>Comparative/ Global studies</b> | <b>Findings</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Comments</b>                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------|-------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Facilitating conditions that drive inter-firm knowledge sharing to enhance relationship value | Current Study           | Yes                                | <p>Noted that both buyers and sellers in a global supply chain context shared the consensus that environmental uncertainty, environmental fit, organizational fit, and idiosyncratic investments facilitate inter-firm knowledge sharing in spite of the risks and dilemma associated with such activities.</p> <p>Both sides of the dyad found the investments in such activities worthwhile, when outcomes were measured by relationship value, explored from the perspectives of both buyers and sellers.</p> | Examines: how strategic outcomes are achieved through inter-firm knowledge sharing; the facilitating conditions that lead to inter-firm knowledge sharing; implications on horizontal segmentation pertaining to firms' sourcing and marketing activities. |

## **PURPOSE AND CONTRIBUTION OF THE STUDY**

The principle objective of this dissertation is to contribute to interorganizational learning theory and the field of global supply chain management by filling the gaps in prior research. From a global supply chain perspective, this research specifically examines how strategic outcomes are achieved through inter-firm knowledge sharing. Building from the resource-based view (Barney 1991; Rumelt 1984, 1991; Wernerfelt 1984), the relational view (Dyer and Singh 1998) and interfirm relationship theories (Cannon and Perreault 1999; Heide 1994; Dwyer, Schurr and Oh 1987; Morgan and Hunt 1994), this study advances one possible explanation. It is hypothesized that strategic outcomes are achieved through inter-firm knowledge sharing among supply chain partners.

The second objective of the study is to examine the facilitating conditions relating to global environmental factors and partnering firms' interorganizational properties that enhance the level of inter-firm knowledge sharing among global supply chain partners. The constructs used in previous studies (see Jap 1999; Selnes and Sallies 2003) will be carefully re-examined and tested in this new and highly complex context. The study will also examine the role of environmental fit as important environmental conditions that lead supply chain partners to engage in knowledge sharing that enhances relationship value. The moderating effect of cultural distance will also be examined.

Specifically, this research seeks to answer the following two research questions:

- (1) What are the facilitating conditions that enhance the level of inter-firm knowledge sharing among global supply chain partners?

- (2) What effect does inter-firm knowledge sharing have on relationship value?

This study helps managers understand whether firms that engage in such relationships experience outcomes that make the process worthwhile. The dyadic design (supplier – manufacturer) of the study also provides insight to how firms commit their resources to engage in knowledge sharing activities with their overseas trade partners. The study also discusses the implications on horizontal (i.e. cross-border) segmentation pertaining to firms' sourcing and marketing activities.

## **DISSERTATION ORGANIZATION**

The dissertation is structured in the following manner. Chapter 1 serves to introduce the impetus for studying the phenomenon of inter-firm knowledge sharing and its effect on relationship value in a global supply chain context. The chapter also lays out the research objectives, the potential contribution expected from this study, and an outline of the organization of this dissertation.

Chapter 2 provides the literature review and introduces the relationships among the constructs. It also presents the research hypotheses to be tested.

Chapter 3 describes the methodology used to test the model and associated hypotheses. Included are discussions of the research design, measurement development and purification, data collection and data analysis procedures.

Chapter 4 explains the data analyses and the results of the hypotheses testing. A comprehensive evaluation of the final sample data was provided, including: sample response rate, demographics, descriptive statistics, and nonresponse bias. Reliability and

construct validity were tested, using the final sample data, for each of the constructs in the structural equation model. Finally, the model evaluated and the results of the hypotheses testing presented.

Chapter 5 provides a discussion of the results and a summary of the significance of the dissertation. Limitations of the study, recommendations for future research, and implications for theory and management are specified in the same chapter.

## **CONCLUSIONS**

Supply chain management involves competing on *value* – collaborating with customers and suppliers to create a position of strength in the marketplace based on the value delivered to the end consumer, as well as supply chain partners. The overall objective of supply chain management is to increase the competitive advantage of the supply chain as a whole, rather than to increase the advantage of any single firm. This study suggests that the means to accomplish this objective is through inter-firm knowledge sharing that enhances relationship value for both the customers and the suppliers.

In today's business environment, firms no longer think the boundaries of their business world begin and end in their own home country. Multinational and global firms have been increasing in numbers, in diversity of industry, and in countries of origin. Firms are looking to global markets and even undertaking dramatic reorganization to become globally more competitive (Wortzel and Wortzel 1997). Globalization has posed both great opportunities and challenges to supply chain managers. It is a mammoth task for researchers to continue coming up with coherent research programs that deal with the

issue of configuration and coordination in global supply chain management and address the full complexity of global supply chain economics.

This study provides insight to help understand the phenomenon of inter-firm knowledge sharing and its effect on relationship value in a global supply chain context. It discusses the implications on horizontal segmentation pertaining to firms' sourcing and marketing activities. The study hopes to stimulate more interests in the field, so that more research will be undertaken to help in future understanding, management and research in the area of global supply chain management.

## **CHAPTER TWO**

### **REVIEW OF THE LITERATURE**

#### **INTRODUCTION**

The purpose of this chapter is to provide a review of the relevant literature, and to introduce some of the theoretical fundamentals that are utilized to build the conceptual model and hypotheses developed in this dissertation.

This dissertation integrates several major theories in organizational studies with some of the most important areas in current marketing and supply chain management research. The four theoretical frameworks are: Resource-Based View, Transaction Cost Economics, Relational Exchange View, and Political Economy Paradigm. The research domains in this study include: inter-firm knowledge sharing, relationship value and global supply chain management.

Each of these literature domains is included in order to provide a comprehensive review of the extant research that supports the research objectives described in Chapter 1. The research questions are: (1) What are the facilitating conditions that enhance the level of inter-firm knowledge sharing among global supply chain partners? (2) What effect does inter-firm knowledge sharing have on relationship value?

#### **THEORETICAL FOUNDATION**

##### **Resource Dependency Theory/Resource-Based View/Knowledge-Based View**

The origins of Resource Based Theory date back to Penrose (1955, 1959) and her internal study of firm growth. The theory focuses on the ability of a firm to be a creator

of core competencies through capabilities rather than an avoider of negative market conditions (Prahalad and Hamel 1990). The theory rejects the economic market assumptions of perfect information, perfect resource mobility, and resource divisibility, focusing instead on resource uniqueness and capabilities (Conner 1991).

Wernerfelt revived Resource Based Theory in 1984 to analyze the firm from the resource side rather than the product/market side. Wernerfelt criticized the way economists treat the inner workings of the firm, which he termed firm resources, as a simple black box. Thus, his analysis proposed that firm resources matter to performance, resource positions build barriers to entry and competition, balance is needed between resource exploitation and development, and specific resources are transferred by acquisition (Wernerfelt 1984). It also argued that differential firm performance is fundamentally due to firm heterogeneity (Barney 1991; Rumelt 1984, 1991; Wernerfelt 1984).

Resource Based Theory of the firm has been used widely by both management and marketing researchers to assess strategic options (Wernerfelt 1984), competitive advantage (Peteraf 1993), and alliance formulation (Eisenhardt 1996) among other issues. Researchers have also worked to incorporate Resource Based Theory into the existing organizational economic paradigms of transaction cost economics (Combs and Ketchen 1999) and market competition (Hunt and Morgan 1996). These authors suggest that the combination of complementary views of the firm will develop a more holistic understanding of how and why firms exist in terms of resource relationships (Dyer and Singh 1998) and governance structure (Ghosh and John 1999).

The earlier version of the theory is resource dependency theory. Both theories are founded on the principle that organizations face uncertainty about their supply of resources and competencies. As Child and Faulkner (1998) suggest, when these resources and competencies are not readily or sufficiently available, firms are likely to establish ties with other organizations. Few organizations are internally self-sufficient. This creates potential dependence on other firms from whom resources are obtained and introduces uncertainty to the extent that resources flows are not under control (Heide 1994). As a strategic response, firms thus purposely establish ties with other firms to reduce uncertainty and manage the dependence.

It was believed that resource scarcity prompted firms to engage in interorganizational relationships in an attempt to exert power or control over those that had resources (Pfeffer and Salancik 1978). As more cooperative relationships began to form, researchers began to disagree with the power and control motive and developed the resource based view, which noted that important internal resources can be obtained from external sources (Barringer and Harrison 2000). Thus, productivity gains are possible when organizations are willing to make idiosyncratic investments and combine their resources in unique ways (Asanuma 1989; Dyer 1996).

The literature also makes it increasingly clear that a knowledge-based view is the essence of the resource-based perspective (Conner and Prahalad 1996). The central theme emerging in the strategic management resource-based literature is that *knowledge* is a basic source of advantage in competition. The resource-based view generally addresses performance differences between firms using asymmetries in knowledge (and

in associated competencies or capabilities). A resource-based theory of the firm thus entails a knowledge-based perspective (see Table 2.1 for summary of related literature).

### **Transaction Cost Economics**

Transaction costs are the costs of developing and maintaining an exchange relationship, monitoring exchange behavior, and guarding against opportunism in an exchange situation (Williamson 1985). The purpose of the theory of transaction cost economics is to explain the choice of how transactions are organized (Child and Faulkner 1998). Coase first conceived the initial concept in 1937. However, the concept is more often attributed to Williamson (1975, 1985, 1996) who led the evolution of the application of the concept from the firm to channel relationships. Drawing on this framework, valuable insights have been provided in areas that include make versus buy decisions (Anderson 1985; Walker and Weber 1984), relationships between manufacturers' agents and their principals (Heide and John 1988), the relative attractiveness of integrated versus independent channels in the international distribution of products (Anderson and Coughlan 1987; Klein, Frazer and Roth 1990), and alliances or joint action in buyer-seller relationships (Frazier, Spekman and O'Neal 1988; Heide and John 1990).

The theory describes the organization of economic activity as a decision between market exchange and vertical integration. Market exchanges are one-time, spot transactions based upon the efficiencies of open, competitive markets. Buyers use price as a primary criterion for their purchase decisions. Vertical integration occurs when the

**Table 2.1 Examples of the Knowledge-Related Emphasis in the Resource-Based Literature<sup>1</sup>**

| <b>Authors</b>                   | <b>Key Perspectives</b>                                                                                                                                                                                                                                                                                                      |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Winter (1988)                    | Fundamentally, business firms are organizations that know how to do things...Firms perform their functions as repositories of knowledge... (p. 175, 177).                                                                                                                                                                    |
| Prahalad and Hamel (1990)        | Core competencies are the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies (p. 82).                                                                                                                                            |
| Teece, Pisano and Shuen (1990)   | It is not only the bundle of resources that matter, but the mechanisms by which firms learn and accumulate new skills and capabilities, and the forces that limit the rate and direction of this process (p. 11).                                                                                                            |
| Kogut and Zandar (1992)          | The theoretical challenge is to understand the knowledge of a firm as leading to a set of capabilities that enhance the changes for growth and survival (p. 384).                                                                                                                                                            |
| Cyert, Kumar and Williams (1993) | It is the existence of knowledge of internal production techniques or external opportunities in the hands of a small number of firms that creates the market imperfections necessary to generate rents for the firm. Put another way, it is proprietary knowledge that creates a comparative advantage for the firm (p. 57). |
| Grant (1996)                     | Knowledge has emerged as the most strategically-significant resource of the firm...The primary role of the firm, and the essence of organizational capability, is the integration of knowledge. (p. 375).                                                                                                                    |

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<sup>1</sup> Developed using Conner and Prahalad, 1996.

firm internalizes the market transaction and imposes a bureaucratic control mechanism to oversee the exchange. The decision to engage in market exchange or vertical integration depends upon the transaction costs associated with each option. In general, these costs stem from the interaction of a set of human factors (bounded rationality and opportunism) and the presence of asset specificity and uncertainty (Williamson 1985, p. 31). Asset specificity is the degree of investments made in support of particular transactions that cannot be redeployed to other uses. Uncertainty refers to the situation in which the circumstances surrounding an exchange cannot be determined *ex ante*. Asset specificity facilitates expectations of continued exchange into the future (Heide and John 1990) and represent credible commitments to the relationship that are useful in safeguarding against opportunistic behavior (Anderson and Weitz 1992; Williamson 1985). Uncertainty creates the need for firms to be adaptable (Heide 1994). The higher the need for safeguards and adaptability, the higher the transaction costs, and the more likely firms will move away from arm's length market exchange toward integrated relationships (Heide and John 1988).

### **Relational Exchange View**

Macneil (1978, 1980) draws on modern contract law relationships to suggest that the nature of the interpersonal relationship surrounding a contract is paramount. This relationship provides important social norms that aid in the governance of contractual behavior, provides a reference for dispute resolution, and a setting that fosters a desire for relationship continuance. Ouchi (1979) shares a similar concept using a clan mechanism. In a clan, a normative process occurs in which members adopt the norms of the larger

system through socialization efforts. Hence, deviance or opportunism is dealt with through self-control based on internalized values.

Expanding the industry structure view (Porter 1980) and the resource-based view (Barney 1991; Rumelt 1984, 1991; Wernerfelt 1984), Dyer and Singh (1998) offer a view to explain how competitive advantages are achieved in interorganizational contexts. It is suggested that a firm's critical resources may span firm boundaries and may be embedded in interfirm resources and routines. Arm's length exchanges, minimal information and coordination devices, and low interdependence, are incapable of generating profits beyond what other buyer-seller combinations can generate because of their lack of inimitability. They propose that, by moving from arm's length exchanges and specializing their relationships through idiosyncratic investments, knowledge sharing routines, complementary competencies, and more effective governance mechanisms, firms can create the potential for earning competitive advantages. Thus, relationships between organizations may be a source of competitive advantage, and the dyad becomes the relevant unit of analysis. Furthermore, relationships not only adapt passively to changing environment but also interact more strategically and, through collaboration and joint learning, develop competitive advantage (Dyer and Singh 1998). Relational contracting theory and relational exchange view are useful in accounting for alternative forms of interorganizational exchange apart from market transactions and vertical integration. However, the relational paradigm fails to specify the conditions under which these alternative forms may occur or when they are appropriate, despite the fact that it is implicitly based on a recognized need to adapt relationships to changing circumstances (Heide 1994).

## **Political Economy Paradigm**

The political economy paradigm (Stern and Reve 1980; Wamsley and Zald 1973, 1976; Zald 1970a; Zald 1970b) was introduced to denote what is now known as economics. It has been shown to be useful in the analysis of individual organizations (Zald 1970b) and interorganizational networks (Benson 1975). The paradigm basically integrates concepts from social exchange, the behavioral theory of the firm, and transaction cost economics. It views a social system as comprising interacting sets of major economic and sociopolitical forces which affect collective behavior and performance.

In marketing research, Stern and Reve (1980) extend the political economy framework into the context of channel dyads. Distribution channels are interorganizational “collectivities” of institutions and actors simultaneously pursuing self-interest and collective goals (Reve and Stern 1979; Van de Ven, Emmett, and Koenig 1974). As such, the actors interact in a socioeconomic setting of their own, called an internal political economy (Stern and Reve 1980). The framework suggests that a channel be analyzed in relation to its (1) internal economy, i.e., the internal economic structure and processes, and its (2) internal polity, i.e., the internal sociopolitical structure and processes.

The internal economic structure is described by the type of transactional form linking channel members, i.e., the vertical economic arrangement within the marketing channel, while the internal economic processes refer to the nature of the decision mechanisms employed to determine the terms of trade among the members. On the other hand, the internal sociopolitical structure is defined by the pattern of power-dependence

relations that exist among channel members, while the internal sociopolitical processes are described in terms of the dominant sentiments (i.e., cooperation and / or conflict) within the channel (Stern and Reve 1980. p.54). To gain a better understanding of the internal structuring and functioning distribution system, researchers need to consider the interactions between the economy and the polity.

The framework also acknowledges that the environment of a distribution channel is a complex of economic, physical, cultural, demographic, psychological, political, and technological forces. Therefore forces such as the external economy, i.e., the prevailing and prospective economic environment, and the external polity, i.e. the external sociopolitical system in which the channel operates, need to be incorporated to provide a more comprehensive view (Stern and Reve 1980).

The central theme of the political economy approach rests in simultaneous analysis of the power and control system of the channel and productive aspects that transform inputs to outputs with an emphasis on mutual dependence. Subsequent studies on the framework in marketing channels have focused on the impact of environmental variables such as environment type (Achrol, Reve and Stern 1983), uncertainty and dependence constraints (Dwyer and Welsh 1985). Mohr and Nevin (1990) further developed a model to examine how an individual member's influence strategy is moderated by the impact of channel conditions (such as structure, climate, and power) on channel outcomes (e.g., coordination, satisfaction, commitment, and performance).

## **THE RESEARCH DOMAINS**

### **The Concept of Knowledge**

Since the focal interest of this study is knowledge sharing, it is useful to explore the meaning of knowledge. This question has intrigued some of the world's greatest thinkers from Plato to Popper without the emergence of a clear consensus (Grant 1996). In organizational studies, most scholars divide knowledge into two broad categories: (1) explicit knowledge or information, and (2) tacit knowledge or know-how (Grant 1996; Kogut and Zander 1992). Information is defined as easily codifiable knowledge that can be transmitted "without loss of integrity once the syntactical rules required for deciphering it are known. Information includes facts, axiomatic propositions, and symbols" (Kogut and Zander 1992, p.386). In the supply chain context, it could mean inventory movement, production schedule, production capacity, shipment data, customer orders, customer sales and demand forecasting (Tan 1999). By comparison, know-how involves knowledge that is tacit, 'sticky', complex, and difficult to codify (Kogut and Zander 1992; Nelson and Winter 1982; Szulanski 1996). The properties of know-how suggest that, compared to information, know-how is more likely to result in advantages that are sustainable (Nonaka 1994).

Based on the synthesis of several epistemologies, Kakiyama and Sorensen (2002) suggest four knowledge discourses: knowledge as object, knowledge as process, knowledge as interpretation, and knowledge as relationship. These ideas were empirically validated in a case study about a fire crisis of Aisin Seiki, one of the biggest parts suppliers of Toyota, a Japanese car manufacturer (see Nishiguchi T. and A. Beaudet

1998, 2000). The case summarizes the idea that knowledge is by nature emergent in terms of its interpretative, process-oriented and relational properties; and knowledge in organizational contexts is generated through complex, dynamic and fluid interactions between actors, organizations and social environments.

The literature on analysis and management of knowledge points to the following characteristics as pertinent to the utilization of knowledge by firms to create value.

### **The Characteristics of Knowledge**

#### ***Transferability***

Grant (1996) identifies *knowing how* with tacit knowledge, and *knowing about* facts and theories with explicit knowledge. The critical distinction between the two lies in transferability and the mechanisms for transfer across individuals, across space, and across time. Explicit knowledge is revealed by its communication. This ease of communication is its fundamental property. Tacit knowledge is revealed through its application. If tacit knowledge cannot be codified and can only be observed through its application and acquired through practice, its transfer between people is slow, costly, and uncertain (Kogut and Zander 1992).

#### ***Capacity for Aggregation***

The efficiency with which knowledge can be transferred depends, in part, upon knowledge's potential for aggregation. Knowledge transfer (sharing) involves both transmission and receipt. Efficiency of knowledge aggregation is greatly enhanced when knowledge can be expressed in terms of common language (Grant 1996). Explicit knowledge can be efficiently transferred through advances in information technology.

Conversely, information about a firm's managerial capabilities is considered as idiosyncratic, and is not easily aggregated at a single location.

### ***Appropriability***

Appropriability refers to the ability of the owner of a resource to receive a return equal to the value created by that resource (Levin, Klevorick, Nelson and Winter 1987; Teece 1987). Grant (1996) suggests that "knowledge is a resource which is subject to uniquely complex problems of appropriability." Tacit knowledge is not directly appropriable because it cannot be directly transferred: it can be appropriated only through its application to productive activity. Explicit knowledge suffers from two key problems of appropriability: first, as a public good, any one who acquires it can resell without losing it (Arrow 1984); second, the mere act of marketing knowledge makes it available to potential buyers (Arrow 1971). Thus except for patents and copyrights where knowledge owners are protected by legally established property rights, knowledge generally is inappropriable by means of market transactions. While most explicit knowledge and all tacit knowledge is stored within individuals, much of this knowledge is created within the firm and is firm specific. This creates difficulties over the allocation of the returns of knowledge and achieving optimal investment in new knowledge (Rosen 1991).

In this study, the term knowledge is used with the above understanding, and includes both tacit and explicit knowledge.

Other aspects of knowledge, such as valuing information and knowledge (see Glazer 1991); organizational information processes (see Beyer and Trice 1982; Glaser,

Abelson, and Garrison 1983; Moorman 1995); and measurement of knowledge utilization (see Menon and Varadarajan 1992) are beyond the scope of this study.

### **Inter-firm Knowledge Sharing**

Collective strategies in the shape of different types of inter-firm collaboration are often mentioned as one of the means to acquire knowledge and increase the competence of an organization (Balakrishnan and Koza 1995; Hagedoorn 1993; Huber 1991; Pucik 1988). There has been some recent conceptual as well as empirical research on how organizations exploit these learning opportunities in various strategic alliances (Dodgson 1993; Inkpen and Crossan 1995; Osland and Yaprak 1995). However, few have attempted to extend organizational learning theory to an interorganizational level (cf. Lane and Lubatkin 1998). The lack of connection to learning is also found in the more general interorganizational research (e.g., Galaskiewicz 1985, Oliver 1990).

While the individual organization learns by changing its actual routines (Argyris and Schon 1978; Bengtsson and Ohlin 1993; Levitt and March 1988) or potential repertoire thereof (Hedberg 1981; Huber 1991), partnering firms can learn by changing their interorganizational routines or repertoire or possible joint activities. Inter-firm knowledge sharing can then be viewed as the collective acquisition of knowledge among a set of organizations. Partnering firms develop their collective knowledge by constructing and modifying their interorganizational environment, working rules, and options. This interorganizational learning can be further specified as distinct from organizational learning by including the learning synergy or interaction effect between

the organizations that would not have occurred if there had not been any interaction (Larsson, Bengtsson, Kenriksson and Sparks 1998).

As Grant and Baden-Fuller (1995) argue, firms may be characterized both as product domains and knowledge domains. Efficient knowledge utilization requires congruence between the knowledge domain of the firm and its product domain.

Typically, perfect congruence does not exist: the firm's knowledge is not fully deployed by the products it supplies, and the knowledge required by the products supplied is not entirely available from *within* the firm. Imperfect congruence between firms' product and knowledge domains thus creates opportunities for inter-firm knowledge sharing to achieve fuller utilization of knowledge.

Following Selnes and Sallis (2003), this study defines **inter-firm knowledge sharing** as "a joint activity between a supplier and a customer in which the two parties share information, which is then jointly interpreted and integrated into a shared relationship-domain-specific memory that changes the range or likelihood of potential relationship-domain-specific behavior" (p.80). It is thus a process to improve future behavior in a relationship. Inter-firm knowledge sharing is conceptualized as a joint activity in which the two firms strive to create more value together than they would create individually or with other partners. It is treated as a multi-dimensional construct with multiple facets that include information sharing, joint sense making, and knowledge integration. According to Selnes and Sallis (2003, p.80), this conceptualization is consistent with the interaction perspective on relationship building that Hallén, Johanson, and Seyed-Mohamed (1991) and Håkansson and Snehota (1995) address. This interaction perspective suggests that two firms simultaneously

affect and are affected by each other in relatively enduring ways. Adaptations stem from the need to coordinate the activities of the individual and companies involved. The three-dimensional nature of inter-firm knowledge sharing was tested through a second-order factor analysis (see Selnes and Sallis 2003, p. 86).

Relational governance perspective (e.g., Heide and John 1990) also suggests inter-firm knowledge sharing as a capability of the relationship. It is believed that the capability of a relationship to learn is closely connected with how it is managed and the context in which it is embedded (Selnes and Sallis 2003).

Various scholars have recognized that inter-firm knowledge sharing is critical to competitive success, noting that organizations learn by collaborating with other firms as well as by observing and importing their practices (Levinson and Asahi 1996; Powell, Koput and Smith-Doerr 1996). If the network can create a strong identity and coordinating rules, then it will be superior to a firm as an organizational form at creating and recombining knowledge due to the diversity of knowledge that resides within a network (Dyer and Nobeoka 2000).

In this study, we look at the primary purpose of inter-firm knowledge sharing as connecting a customer's buying activities with a supplier's selling activities and services. It can expand in scope and include other activities as well, such as joint R&D, joint marketing, joint quality control, and so forth. A well-performing knowledge sharing relationship exists if both parties are satisfied with both the relationship's effectiveness (i.e. doing the right things) and efficiency (i.e. doing things the right way).

In global supply chain management, market-driven organizations will recognize that the responsibility for creating and delivering superior value does not lie within a firm

across its different functional departments (Craven 1998). Linked firms within supply chains share that same responsibility and should contemplate coordination of value understanding, creation and delivery across the whole supply chain (Flint 2004). Thus, this study proposes that knowledge sharing with customers in the supply chain is the first step in value understanding; and knowledge sharing with suppliers in the supply chain provides insights and enhances the effectiveness and efficiency in value creation and delivery.

### **The Issue of Ownership and Organizational Structure in Inter-firm Knowledge Sharing**

As discussed in the previous Chapter, it is clear that inter-firm knowledge sharing involves risks and dilemma (Dyer and Nobeoka 2000; Gulati, Nohria and Zaheer 2000; Marwell and Oliver 1993; Sandler 1992; Wood and Gray 1991). Based upon the theory of transaction cost economics (Coase, 1937; Williamson 1975, 1985, 1996), when there is a high need for safeguards of opportunistic behavior of the partners, firms are likely to move away from arm's length market transactions toward integrated relationships (Heide and John 1988). In inter-firm knowledge sharing studies, we thus need to acknowledge the different challenges and issues faced by firms with different organizational and relational structures. Joint ventures, horizontal relationships, and vertically integrated relationships such as headquarter-subsidary setups or equity alliances are integrated relationships through *common* equity and *common* ownership. The presence of equity not only aligns the interests of the partner firms but also provides a basis for monitoring partner behavior (Hennart 1988; Kogut 1988; Pisano 1989) so as to reduce the possibility

of opportunistic behavior by the partner. Alignment of interests due to equity is expected to result in much closer interaction between the partners. This interaction should facilitate knowledge sharing, especially tacit knowledge, across loosely connected firms (Badaracco 1991). Various studies have shown that equity arrangements promote greater interfirm knowledge sharing than mere contractual ones (Kogut 1988; Mowery, Oxley and Silverman 1996). In addition, since equity alleviates the hazard of opportunism, the likelihood of a firm losing its core proprietary know-how to the partner is minimized. However, in vertical relationships between *functionally interdependent* but *financially independent* firms (such as manufacturers and their suppliers, manufacturers and their distributors), inter-firm knowledge sharing requires a different set of facilitating conditions (see Jap 1999; Selnes and Sallis 2003). In exchange relationships where separate legal entities are not formed, partner characteristics and relationship-based governance mechanisms are likely to assume greater salience as coordinating mechanisms since bureaucratic lines of control are typically absent (Sarkar, Echambadi, Cavusgil and Aulakh 2001).

The context of this study is ongoing, vertical relationships between independent buyers and sellers. Joint ventures, horizontal relationships, and vertically integrated relationships through equity ownerships are beyond the scope of this study.

### **The Concept of Value Creation**

Despite the growing trend toward collaborative relationships, the literature is deficient in some important ways (Kalwani and narayandas 1995). Various important functions of business relationships in creating value for the partner firms are widely

assumed in the literature. Furthermore, there is a strong concentration on value for customers neglecting that value is also created for suppliers (Walter, Ritter and Gemunden 2001). This study integrates the perspectives from both the buyers and the sellers in the examination of the concept of value creation in a supply chain dyad.

### **Value Creation - Buyer's Perspective**

There have been a growing number of researchers making the case that managing a business to deliver superior value to targeted customers can lead to improved performance (Gale 1994; Kaplan and Norton 1996; Naumann 1995; Slywotzky and Morrison 1997; Wayland and Cole 1997; Woodruff 1997).

At a broad level, the term *value* shows up in several very different contexts. It could mean value from the perspective of an organization that strives to create and deliver superior customer value to *high-value* customers who will increase the *value* of the organization (Slywotzky 1996). As Woodruff (1997) suggests, the latter two value concepts consider value from the perspective of an organization. *High-value customer* quantifies the monetary worth of individual customers to the organization. It is similar to what Flint, Woodruff and Gardial (2002, p.103) refer to as “the economic (e.g., profit) value to a seller of patronage by a customer over a lifetime.” *Value of an organization* quantifies an organization’s worth to owners. On the other hand, taking the perspective of an organization’s customers, it could mean what they want and believe that they get from buying and using a seller’s product (Woodruff 1997). This dissertation adopts this *customer-directed* concept.

Flint (2004) suggests looking at customer value from two theoretical foundations: a customer value theory of the firm (Slater 1997), and customer value theory (Woodruff 1997). The customer value theory of the firm (Slater 1997) highlights the importance of (1) continuous learning about customers (not just from customers), (2) a commitment to continuous innovation, and (3) a customer value process-focused organization. Customer value theory as reviewed by Woodruff (1997) (1) focuses on customer perceptions of value, (2) draws on means-end theory in the development of customer value hierarchies that include customers' desired product/service attributes, desired consequences of experiencing those attributes, and desired goals/end-states, and (3) integrates customer value learning, creation and delivery processes.

Customers may value many aspects of an exchange, which may involve a product, brand, store, or interactions with a salesperson (Holbrook 1994; Lai 1995; Zeithaml 1988). Furthermore, customer value perception may occur throughout all stages of consumption (Huber and Herrmann 2000). The literature generally agrees that customer value involves trading off benefit versus sacrifice experiences within use situations (e.g., Hauser and Urban 1986; Lapierre 2000; Slater and Narver 2000; Teas and Agarwal 2000; Zeithaml 1988). The benefit side of value includes more than quality and the sacrifice side includes more than price (e.g., Day and Crask 2000; Holbrook 1994; Slater and Narver 2000), even though many practitioners tend to equate value solely with these two dimensions (Flint, Woodruff and Gardial, 2002). More recently, Day and Crask (2000) and Huber and Herrmann (2000) suggest that risks associated with a product or service should be included in the customer value phenomenon.

In an industrial (business-to-business) context, research in this area has suggested a set of different dimensions of customer value. They include *functional benefits* (pertaining to products and services), and *relationship benefits* (Lapierre, 2000; Ravald and Grönroos, 1996; Sheth and Sharma, 1997; Woodruff and Flint, 2003). Business customers also consider those benefits in light of monetary and nonmonetary sacrifices (Lapierre, 2000). Functional benefits lie in customer value hierarchies centering on product availability and quality, delivery service quality, and pricing by suppliers (Garver, Gardial and Woodruff, 1999). At the functional level, two relevant dimensions are efficiency (lower cost) and effectiveness (added benefits). At any point along a supply chain, value can be created by making the customer firm either more efficient in its operations, thus lowering cost, or more effective in its markets. In addition, customers perceive relationship benefits stemming from the quality of the interactions going on between customers and suppliers (Dwyer, Schurr & Oh 1987; Garver, Gardial and Woodruff 1999; Weitz and Jap 1995; Wilson 1995). Various kinds of relationship benefit include both a business side, such as the customer's perception of trust and loyalty, and an interpersonal side, such as the customer feeling comfortable with a salesperson, feeling taken care of, and enjoying the relationship (Garver, Gardial and Woodruff 1999).

Flint (2004) observes a critical challenge marketing strategists face in global supply chain management when adopting a customer value orientation. A supply chain perspective means firms must understand what their immediate down-stream customers and their customers' customers value, ideally through to what end-use customers value. When these supply chains span multiple nations, the differences in firm and decision maker values, goals, use situation, and relative importance rankings of product and

service attributes (Mentzer, Myers and Cheung 2004) becomes more pronounced. Firms also need to recognize the fact that many of those organizations are embedded in very different national cultures, regional business norms, economic situations, and regulatory environments. These and other differentiating variables drive firms to value different benefits and tolerate different sacrifices around the globe (Flint 2004; Mentzer, Myers and Cheung 2004).

Researchers also suggest that another emerging insight into business-to-business customer value concerns its *dynamic* nature (Woodruff and Flint, 2003). Over time, customers change what they value from suppliers. Flint, Woodruff and Gardial (2002) discovered that tension within a business-to-business customer organization, as reflected by a heightened sense of urgency, anxiety, and even panic, creates motivation to change what they value from a supplier. This tension could derive from externally driven event pressures, such as in the customer's market (new quality initiatives by the customer's customers), or internally within a customer organization (new top management direction to achieve a higher shareholder value return). These events can be grouped into five categories: (1) changes in customers' customer demand; (2) changes internal to customer organizations; (3) moves made by customers' competitors; (4) changes in suppliers' performance and/or demands; and (5) changes in the macro environment. All this tension will result in changes in what customer value from their suppliers (Flint, Woodruff and Gardial 2002). This sums up what Woodruff (1997) has rightly suggested: adopting a customer value delivery orientation requires organizations to *learn extensively* about their markets and target customers. As knowledge develops about changes in what the customers value, it will become easier for marketers to look further down their supply

chains to see changes emerging multiple links away from themselves providing additional lead time for strategic planning and adjustments. Competitive advantage will then be gained by developing better processes for customer value prediction regionally and globally (Flint, 2004).

### **Value Creation – Seller’s Perspective**

The concept of customer value discussed above can be applied to the other side of the dyad in the exchange relationship – i.e. the suppliers. Value creation is regarded as the essential purpose for a customer firm *and* a supplier firm engaging in a relationship (Anderson 1995; Wilson 1995; Grönroos 1997). Suppliers seek more than just economic value in an exchange relationship (Walter, Ritter, Gemuenden 2001). To require the suppliers to only attend the customers’ interests without return is a one-way track to economic losses. The relationship will not last. Suppliers would like to be cared for and treated as a ‘customer’ too in an exchange relationship. They need to offer value to the customers but also need to gain values from the customers at the same time. For the sake of their own survival, suppliers need to understand how value can be created through their relationships with customers. As such, it is important to explore the concept of customer value also from the suppliers’ perspectives (*suppliers as customers*). Such an understanding will guide suppliers to a meaningful use of relationships and prevent them from pure altruistic customer orientation (Walter, Ritter, Gemuenden 2001).

Walter, Ritter and Gemuenden (2001) conceptualize value creation as a set of direct and indirect functions of customer relationship based on performed activities and employed resources of a customer firm. The authors present findings from an empirical

study indicating that both direct and indirect functions contribute to the value perceived by a supplier. Direct functions include: the profit function, the volume function, and the safeguard function (that could improve the cost-efficiency of the supplier given the uncertainties in competitive markets).

Indirect functions of business relationships capture connected effects in the future and/or in other relationships - the wider network. Suppliers also establish relationships with customers who are seen to be at the forefront of technology or whose product expertise is high. In such situations, suppliers often discount short-term financial gains for the long-term benefits of networking innovation development. Product and process innovations developed together with customer may improve the value of the supplier's offerings to this customer in the future, as well as to other customers (Gemunden, Heydebreck and Herden, 1992; Hakansson 1987, 1989; Maidique and Zirger 1985; Parkinson 1985). To be successful, suppliers must obtain meaningful information from others outside of the organization (Dixon and Wilkinson 1989; Gordon, Schoenbachler, Kaminski and Brouchous, 1997). Customers often gather and dispose of information about market developments that is relevant and essential to the supplier's business earlier than the supplier would be able to (Hakansson 1987).

### **Relationship Value as a Construct**

Following Lapierre (2000), the relationship value construct in this study is defined as the **difference between the benefits and the sacrifice (the total costs, both monetary and non-monetary) *perceived by buyers/(or suppliers)* in terms of their expectations, i.e. needs and wants** (Day 1990; Hass 1995; Mazumdar 1993; Narver and

Slater 1990; Slater 1996, 1997; Slater and Narver 1992; Raval and Gronroos 1996; Zeithaml 1988). Sacrifices are the overall monetary and non-monetary costs the firm invests or gives to the exchange partner in order to complete a transaction or to maintain a relationship with an exchange partner. Non-monetary costs can be defined as the time/effort/energy and conflict invested by the firm to obtain the products or services or to establish a relationship with an exchange partner (Lapierre 2000). Non-monetary costs are important as many firms count time rather than dollar costs as their most precious asset (Carothers and Adams 1991).

As Mazumdar (1993) states: “Today’s value-conscious customers are neither impressed by the best product nor persuaded by the lowest price alone. Instead, customer purchase decisions are often guided by a careful assessment of what benefits they obtain in exchange for the costs they incur to acquire and consume the product.” In this study, we concur with the majority of researchers who define relationship value in terms of benefit and sacrifice components, and adopt the *total value proposition* (see Lapierre 2000).

Lapierre (2000) identified 13 drivers of value and grouped them into three benefit dimensions (product, service and relationship benefits) as well as two sacrifice dimensions (price and relationship costs). Ulaga (2003) suggests that this conceptualization of customer value included a number of marketing variables, for example, trust and solidarity, which the marketing literature typically considers as distinct constructs. Thus, such a conceptual overload may pose significant problems of discriminant validity.

In an effort to develop guidelines as to how several dimensions proposed in previous studies (see Lapierre 2000; Möller and Törrönen 2003; Walter, Müller, Helfert and Ritter 2003) could be combined to form an overall measure of relationship value, Ulaga (2003) explored the concept from a grounded theory perspective and identified eight value drivers in manufacturer – supplier relationships (see Figure 2.1). He concludes that, to capture the various facets of the construct, research should rely on multidimensional scales of relationship value in business markets rather than overall measures of the construct.

In this study, the construct Relationship Value is explored from the perspectives of *both the buyers and sellers*.

### **Global Supply Chain Management as a Research Domain**

The importance of interorganizational relationships has been given much attention in the marketing and strategic management literature. Advancement in the study of these relationships has resulted in the study of dyads (Anderson and Weitz 1989) and networks (Anderson, Hakansson, and Johnson 1994). Research in these areas proposes that firms possess capabilities that allow them to excel in their markets and, through relational combination, form distinctive/competitive advantages. The evolution of this literature groups these relationships into what is now termed Supply Chain Management (Mentzer 2000), and is defined as **“the 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 purposes of improving the long-term performance of the individual companies and the supply**

|                                                                                                                                                                                                 |                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product Quality</b> <ul style="list-style-type: none"> <li>- Product performance</li> <li>- Product reliability</li> <li>- Product consistency</li> </ul>                                    | <b>Service Support</b> <ul style="list-style-type: none"> <li>- Product-related service</li> <li>- Customer information</li> <li>- Outsourcing of activities</li> </ul>                    |
| <b>Delivery</b> <ul style="list-style-type: none"> <li>- On-time delivery</li> <li>- Delivery flexibility</li> <li>- Accuracy of delivery</li> </ul>                                            | <b>Supplier Know-how</b> <ul style="list-style-type: none"> <li>- Knowledge of supply market</li> <li>- Improvement of existing products</li> <li>- Development of new products</li> </ul> |
| <b>Time-to-Market</b> <ul style="list-style-type: none"> <li>- Design tasks</li> <li>- Prototype development</li> <li>- Product testing and validation</li> </ul>                               | <b>Personal Interaction</b> <ul style="list-style-type: none"> <li>- Communication</li> <li>- Problem solving</li> <li>- Mutual goals</li> </ul>                                           |
| <b>Direct Product Costs (Price)</b> <ul style="list-style-type: none"> <li>- Price above, below, at competition</li> <li>- Annual price decreases</li> <li>- Cost reduction programs</li> </ul> | <b>Process Costs</b> <ul style="list-style-type: none"> <li>- Inventory management</li> <li>- Order handling</li> <li>- Incoming inspections</li> <li>- Manufacturing</li> </ul>           |

**Figure 2.1 Relationship Value Drivers<sup>2</sup>**

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<sup>2</sup> Developed using Ulaga (2003)

**chain as a whole”** (Mentzer et al., 2001).

Research in supply chain management has received a great deal of attention and has risen to prominence over the last decade (Cooper, Ellram, Gardner, and Hanks 1997). However, research specific to *global* supply chain management has been scant. As Frazier (1999) observes, worldwide business trends – including market fragmentation, reduced barriers to free and open competition, one-stop shopping initiatives in consumer and business markets, industry consolidation, and the rapid adoption of new technologies – are magnifying the importance of critical managerial issues and the need to research them. With the growing interdependence of the world economy, firms increasingly are looking to foreign markets for growth opportunities, or to foreign suppliers for improved sourcing opportunities. While there are many forces pushing companies to think more globally - meeting foreign competition head-on, better serving an increasingly global customer base, exploiting diverse capabilities and cost advantages, or taking advantage of an easing global regulatory environment – *changing customer expectations* are the primary reason many companies need to strengthen their *global posture* (de Kluyver 2000, p.134). The concept of supply chain management increasingly has been noted as critical to creating and sustaining competitiveness through coordination and integration of resources both within firms, and across firms within a supply chain (Mentzer 2000). As firms increase their participation in a global economy, developing supply chain management strategy to improve complete value chain (all functional activities) performance becomes increasingly critical.

Supply chain management is about competing on value – collaborating with customers and suppliers to create a position of strength in the marketplace based upon the

value delivered to the end consumer, as well as supply chain partners. The supply chain as a whole can be considered a complete value system delivering products and services to the end consumer. Value can be created at many points along the chain by making the customer firm at that point in the chain more effective in serving its markets, or more efficient and cost-effective in its operation (Slater and Narver 1994). The ultimate basis for value at each step along a supply chain is the role of the product or service in the value created for the ultimate consumer. It is the value needs of the ultimate consumer that dictate the intermediate customer's needs (Porter 1985). Frazier (1999) echoes the same observation and suggests that any business trend that influences end-customer preferences for products and services and channel members' ability to effectively serve end customer will directly affect the organization and management of distribution channels. Thus, we can conclude that an understanding of the entire supply chain is critical in identifying and delivering value that improves the competitiveness of the chain as a whole (Slater and Narver 1994; Woodruff, Locander & Barnaby 1991).

At the macro level, knowledge sharing with global supply chain partners also enhances a firm's ability to anticipate or sense significant changes in cross-border economic, legal and political conditions, and to *reconfigure* supply chain operations in response to such changes.

## **THE CONCEPTUAL FRAMEWORK**

The justification for the conceptual model was developed from the integration of marketing, supply chain management, strategic management, and international business literature. Each of these literature domains was included in order to provide a

comprehensive review of the extant research that supports the research objectives described in Chapter 1. The two research questions were: (1) What are the facilitating conditions relating to global environmental factors and partnering firms' interorganizational properties that lead to inter-firm knowledge sharing among global supply chain partners? (2) What effect does inter-firm knowledge sharing have on relationship value?

As the resource-based view proposes, a resource's capacity to generate profits or to prevent losses depends very much on the fit of a given strategy to the external environment (Amit and Schoemaker 1993; Burns and Stalker 1961; Porter 1991; Thompson 1967; Wernerfelt and Aneel 1987), the combination of organizational and human resources available to the firms, as well as the strategies that the firms employ (Jap 1999). Inter-firm knowledge sharing can be viewed as a system resource, and thus it also relies on these important aspects. They include the macro conditions of the external environment surrounding the firms, the organizational structure within which the dyad operates, and the micro conditions of interpersonal relationships that span the organizational boundaries of the dyad. Working together, these conditions should motivate the firms to expend effort and make investments to support the achievement of strategic outcomes.

It is not possible to consider all the dimensions of these conditions in one single study. The intention of this study is not to be exhaustive but to study a subset of these possible variables and produce an incremental step toward better understanding a rich and complex interorganizational phenomenon in a global context. Prior literature points to a subset of conditions as critical to inter-firm knowledge sharing. They include:

environmental uncertainty, environmental fit, organizational fit, interdependence, idiosyncratic investments, trust and flexibility.

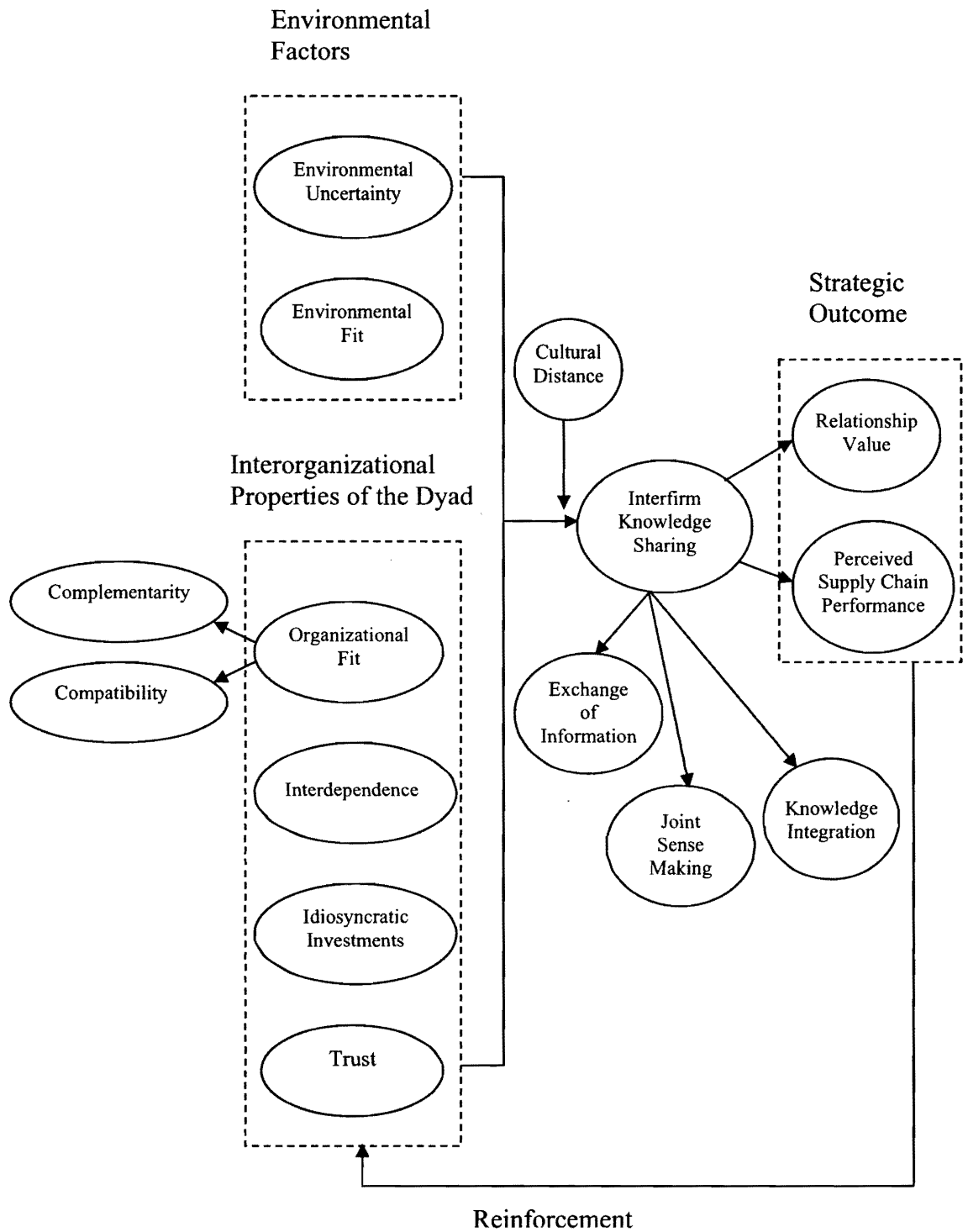
Figure 2.2 outlines the hypothesized relationships among aspects of environmental factor, interorganizational characteristics of the exchange dyad, inter-firm knowledge sharing and strategic performance. There are two parts to the model. The first part pertains to the facilitating conditions for inter-firm knowledge sharing. It states that environmental uncertainty, environmental fit, organizational fit, interdependence, idiosyncratic investments, trust, and flexibility all have a positive effect on the level of inter-firm knowledge sharing. The second part of the model defines inter-firm knowledge sharing and sheds more light on how inter-firm knowledge sharing enhances relationship value and the perceived supply chain performance as a whole. The two sets of strategic outcomes further reinforce the level of inter-firm knowledge sharing between the exchange dyad by strengthening the fit and behavioral factors of the dyad's interorganizational characteristics.

The locations of the hypotheses that will be tested in this study are shown in Figure 2.3.

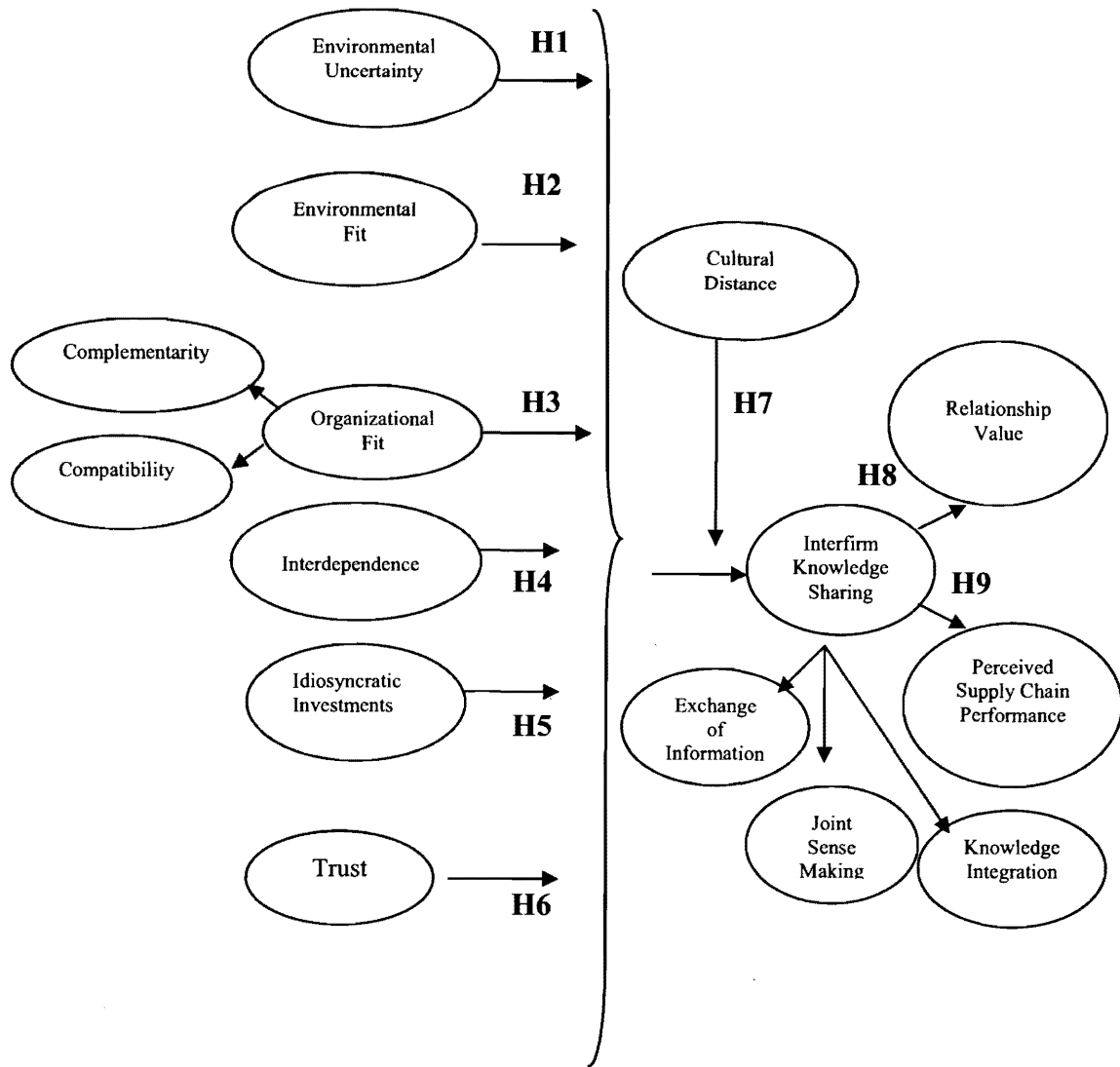
The following sections provide a literature review on each of the constructs used in the model.

### **Environmental Uncertainty**

**Environmental uncertainty is defined as the degree of market volatility and unpredictability faced by a firm or a particular group (Heide and John 1988). In global marketing, environments in which economic foundations and regulations change**



**Figure 2.2 Conceptual Model**



**Figure 2.3 Locations of Hypotheses**

unpredictably and frequently, where competitors are unpredictable and aggressive, or where sales volume or profits are very volatile often significantly hamper organizational decision making (Pfeffer and Salancik 1978) and have a large impact on the performance outcomes of the firm's market venture (Aulakh and Kotabe 1997; Bello and Lothia 1995; Cavusgil and Zou 1994; Hofstede 1991; Selnes and Sallis 2003). Mentzer, Min and Zacharia (2000) suggest that due to the uncontrollable nature of technological changes, firms form partnerships to develop new technologies or products, or to borrow cutting-edge technologies developed by their partners to satisfy customer needs. Flexibility and the ability to adapt rapidly are important in such uncertain environments. Therefore, firms might be motivated to engage in collaboration with partnering firms either to gain some control over externalities or to respond quickly to market changes and challenges (Jap 1999; Mentzer, Min and Zacharia 2000; Oliver 1990; Van de Ven 1976; Wernerfelt and Aneel 1987).

Based on Resource-based View, collaborative relationships that are matched poorly with environmental conditions will fail (Aldrich and Pfeffer 1976; Powell 1990). Similarly, this study expects that the dyad's level of inter-firm knowledge sharing activities will be a function of its primary task environment. More specifically, environmental uncertainty motivates the buyer and supplier to engage in more knowledge sharing activities with each other to cope better with constant change.

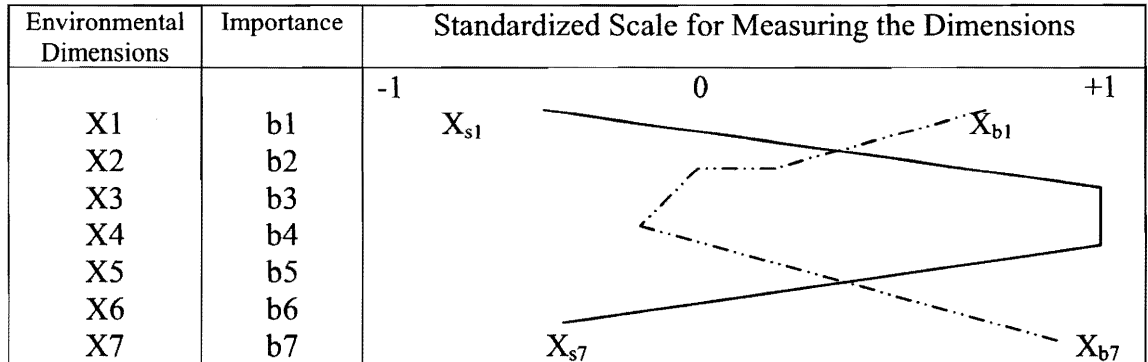
H1: Environmental uncertainty has a positive effect on inter-firm knowledge sharing

## Environmental Fit

As Venkatraman (1989) observed, the concept of fit has served as an important building block for theory construction in several research areas (Aldrich 1979; Fry and Smith 1987; Thompson 1967; Van de Ven and Drazin 1985), including strategic management (Miles and Snow 1978; Snow and Miles 1983; Venkatraman and Camillus 1984). In the profile-deviation perspective proposed by Venkatraman (1989), fit is **“the degree of adherence to an externally specified profile.”** Fit is also defined as “the degree to which the needs, demands, goals, objectives, and/or structures of one component are consistent with the needs, demands, goals, objectives, and/or structures of another component” (Nadler and Tushman 1980). Figure 2.4 shows a schematic representation of Venkatraman’s (1989) profile-deviation perspective adopted by this study to explore the relationship between environmental fit and inter-firm knowledge sharing. ( $X_s$  refers to the scores in the study from the seller group, and  $X_b$  refers to the scores from the buyer group.)

As Myers, Droge and Cheung (2004) summarize, environmental factors that have been investigated in literature include: capacity and dynamism (Achrol and Stern 1988), munificence and complexity (Dess and Beard 1984), regulatory changes to specific industries (Forte, Hoffman, Lamont, and Brockmann 2000), and degree of segmentation (Choi and Rajan 1997). Market environments have a strong influence on the proactive and reactive decisions of firms. From a focal manufacturing firm's perspective, this applies to both the marketing and sourcing strategies.

In market expansion, some firms adopt a market replication or transaction cost reduction approach by entering foreign market environments that resemble domestic ones



**Figure 2.4 A Schematic Representation of Fit as Profile Deviation<sup>3</sup>**

(i.e. high similarity/low deviation between exchange partners' market environments) (Rosenszweig and Singh 1991). Matching of foreign to home environment allows the firm to take advantage of extant competencies, tacit knowledge, routines, and standard operating procedures through replication in the new market. Transaction cost analysis addresses the firm's ability to both specialize in a foreign market environment and benefit from economies of scale based on existing skills, knowledge and assets developed in the primary market (Klein, Frazier, and Roth 1990). On the other hand, some research has shown that maximization of environmental similarity can be counterproductive if organizational change is needed or if the firm has adopted conflicting goals to correspond to a complex competitive environment (Lengnick-Hall and Lengnick-Hall 1988). As Myers, Droge and Cheung (2004) observe, further fit research contends that both fit and

<sup>3</sup> Developed using Venkatraman (1989).

flexibility are essential for effectiveness, given that the strategic management challenge is to cope with change by continually adapting to achieve a fit between the firm and its external environment (Wright and Snell 1998). Environmental diversification thus offers flexibility to shift market penetration efforts and the location of value chain activities according to environmental conditions across countries (Kogut 1985, 1991; Kogut and Kulatilaka 1994). Deviation (or dissimilarity) between exchange partners' home market environments inherently comes with higher unpredictability and uncertainty, and should carry a positive effect to promote inter-firm knowledge sharing to help both sides cope with the challenge more effectively.

In the global sourcing literature, researchers suggest that firms are moving toward an integrated global sourcing strategy to acquire and sustain cost competitiveness, quality improvement, increased exposure to worldwide technology, and delivery and reliability improvements (Kotabe 1989, 1992). Other motives for global sourcing include: (1) taking advantage of government incentives, (2) exploiting or guarding against currency fluctuations, and (3) diversifying supply sources to spread risks (see Cavusgil, Yaprak and Yeoh 1993). As this trend becomes widespread in many industries, there is a need for effective coordination of the sourcing function vertically with the firm's policy objectives, as well as horizontally with its other functional activities to achieve efficient utilization of worldwide material resources (Cavusgil, Yaprak and Yeoh 1993). To mitigate the liability of foreignness, or the liability arising from dealing with dissimilar environments that come with higher risks (Zaheer 1995; Zaheer and Mosakowski 1997), firms will be motivated to further reduce transaction cost by building a strong knowledge sharing network with foreign partners.

In summary, when firms pursue environmental diversification in their overseas sourcing and distribution choices, they may reduce risks and increase strategic flexibility via a heterogeneous supplier and distributor portfolio, and benefit from specific market characteristics (such as technology, government incentives, and economic factors) which differ from their home market profile. The profile deviation between exchange partners in this scenario enhances the need for firms to build up the level of inter-firm knowledge sharing. Thus, we anticipate that, in a cross-border context,

H2: The greater the degree of deviation in environmental fit between the buyer and seller's market environments, the higher the propensity for inter-firm knowledge sharing

### **Organizational Fit**

Recent research suggests the success of both domestic and cross-border collaborations may be a function of partner characteristics (Hitt, Dacin, Levitas, Arregle, and Borza 2000; Madhok 1995; Saxton 1997). In studying alliances, academics and practitioners have usually emphasized some of the *ex ante* structural characteristics of the alliance (Harrigan 1985). Specific importance has been given to the organizational fit between alliances partners, with the following dimensions of fit regarded as most critical: *complementarity* and *compatibility* between the partners (Harrigan 1985; Sarkar, Echambadi, Cavusgil and Aulakh 2001).

Fit in this context is conceptualized using a multivariate perspective named "fit as gestalts" (Venkatraman 1989), which is defined in terms of the degree of internal coherence among a set of theoretical attributes. The role of gestalts has been best described by Miller: "Instead of looking at a few variables or at linear associations among

such variables we should be trying to find frequently recurring clusters of attributes or gestalts” (1981, p. 5).

In a study on a sample of alliances in the global construction contracting industry, Sarkar, Echambadi, Cavusgil and Aulakh (2001) suggest that the issue of partner selection presents firms with a potential paradox, wherein seemingly contradictory elements need to coexist and be simultaneously achieved. Specifically, it was suggested that collaborative value creation requires the pursuit of partners who possess similar characteristics on certain dimensions and dissimilar and/or complementary characteristics on other dimensions.

**Complementarity** between partners refers to the **lack of similarity or overlap between their core businesses or capabilities** – the lower the similarity, the greater the complementarity (Mowery, Oxley and Silverman 1996). In this study, we conceptualize complementarity as the extent to which each partner brings in unique strengths and resources of value to the business exchange. Although the resource-based view underscores key competencies within a firm as the fundamental drivers of the firm’s performance and competitive advantage, some researchers contend that complementarity of these competencies is critical in successfully enhancing performance in interorganizational relationships (Jap 1999). Management theorists increasingly recognize that it is not just skills in one domain, but rather the complementary combination of skills from several domains that gives many firms their competitive advantage (Teece, Pisano and Shuen 1990; Winter 1987). Complementarity serves as a mechanism to ensure that both partners bring different but valuable capabilities to the relationship. It also creates the potential for each firm to learn from its partner. Mowery

et al., (1996) found that complementarity between the alliance partners correlates positively with inter-firm learning across the alliance interface. Similarly, Sarkar et al. (2001) found that interactive learning opportunities that help firms add to their capabilities and know-how are likely to be greater in cases where there is diversity and nonredundancy in knowledge bases.

The other important dimension of organizational fit is the **compatibility** of partners. It is defined as **the congruence in organizational cultures and capabilities between partners that influences the extent to which partners are able to realize the synergistic potential of a relationship** (Modhok and Tallman 1998). Compatibility of partners can be assessed in several ways: operating strategy, corporate cultures, management styles, nationality (Parkhe 1993), and at times even firm size. Other ways to assess compatibility are: goal congruence (Jap 1999), and congruence in collaborative commitment (Selnes and Sallies 2003). Compatibility facilitates the reconciliation of differences between partners (De la Sierra 1995) to enable open and easy exchange between them. Compatibility further allows firms to actually capitalize on the knowledge sharing potential offered by the complementarity of capabilities between them (Kale, Singh and Perlmutter 2000). In a study of 90 joint ventures, Geringer (1988) demonstrates how partner compatibility correlates with alliance success. Overall, organizational fit, in terms of the two dimensions of compatibility and complementarity, is expected to positively impact knowledge sharing activities between partners.

H3: Organizational fit has a positive effect on inter-firm knowledge sharing

## **Interdependence**

Dependence in interorganizational exchange is defined as the extent to which attainment of goals is mediated by another firm and is available only through the relationship with that firm (cf. Emerson 1962). The higher the level of valued rewards anticipated in the relationship relative to those available in alternative relationships, the higher a firm's dependence (Aldrich 1979; Emerson 1962). **Interdependence**, thus, can be defined as the bilateral perception of the need of each party for the other in an exchange relationship to achieve desired goals. When both firms possess a high level of dependence on each other in a dyadic channel relationship, interdependence is high in magnitude and symmetric. In such cases, each firm enjoys a high level of power and the bonds between the firms should be reasonably strong. High joint power is likely to promote trust, commitment, and relational behavior because of the common interests, attention and support found in such channel relationships (cf. Gundlach and Cadotte 1994; Kumar, Scheer, and Steenkamp 1995, Lusch and Brown 1996).

Furthermore, by definition, the higher the interdependence, the more firms rely on each other for the performance of channel functions, as well as for access to scarce resources (knowledge). This joint motivational investment provides both firms with an incentive to make the relationship work and endure (Buchanan 1992). At the same time, they can be expected not to act opportunistically (Buchanan 1992), because opportunism by one firm is likely to provoke retaliation by other (Provan and Skinner 1989). This spiral of opportunism can jeopardize the firm's mutual stake in the relationship (Lusch and Brown 1996).

Interdependence is the most common explanation for the formation of interorganizational cooperative ties. A long stream of research suggests that organizations enter ties with other organizations in response to the challenges posed by the interdependencies that shape their common environment (Aiken and Hage 1968; Pfeffer and Salancik 1978; Aldrich 1979; Galaskiewicz 1982). Broadly defined, interdependence encompasses two sets of considerations: resource procurement and uncertainty reduction (Galaskiewicz 1985). As Gulati and Gargiulo (1999) suggest, organizations build cooperative ties to access capabilities and resources (knowledge) that are essential to pursue their goals but that are at least in part under the control of other organizations in their environment. Knowledge sharing becomes necessary, and is thus a means by which organizations manage their dependence on other organizations and attempt to mitigate the uncertainty generated by that dependence.

The international business arena has always been characterized as an environment with growing uncertainty and high risks (Gulati and Gargiulo 1999). That creates a greater need for global supply chain partners to strengthen their ties in this respect. As supply chains develop globally, they increase in complexity. The number of linkages to be managed also increases. Supply chain members become more dependent on each other (McAdam and McCormack, 2001). Motwani, Larson and Ahuja (1998) believe that global supply chain management allows corporations to take advantage of diversity in the international environment by recognizing and exploiting regional differences. Knowledge and business information must be communicated to the people who need it, when they need it, wherever they are.

Building on the insights of this research tradition, we expect:

H4: Interdependence has a positive effect on inter-firm knowledge sharing

### **Idiosyncratic Investments**

Prior research in inter-firm relations has drawn extensively from transaction cost economics (Williamson, 1985) to examine the nature of buyer-seller relationships (e.g., Heide and John 1992). Merging this stream of research with theoretical developments in international business provides the basis for investigating the antecedents of relationship commitment in an international context. Idiosyncratic investment is one of the constructs that has been identified as potentially important in driving firms' relationship commitment in a global context (Aulakh, Kotabe and Sahay 1997; Lin and Germain 1999; Skarmetas, Katsikeas and Schlegelmilch 2002).

**Idiosyncratic investments are nonfungible investments that uniquely support the buyer-seller relationship** (Williamson 1985). These investments may be tangible (such as a manufacturing facility, a specific tool or machine), or intangible (such as tacit knowledge, a specific technology or capability). The nonfungible nature of these investments means that they are not easily transferable to other relationships or use situations. As such, they lose their value in the event that the relationship is terminated. Such investments promise efficiencies in coordination (Williamson 1985), and help stabilize relationships. By augmenting the costs of dissolving the relationship, such investments bind the firms to the exchange relationship (Anderson and Weitz 1992), and create a lock-in condition (Heide 1994). It was found that they facilitate expectations of continued exchange into the future (Heide and John 1990), and represent credible

commitment to the relationship. They are useful in minimizing opportunistic behavior (Anderson and Weitz 1992, Williamson 1985), and further motivate inter-firm knowledge sharing because this might be a way to enhance return on investments beyond the initial motivation for the investment (Selnes and Sallis 2003).

H5: Idiosyncratic investments have a positive effect on inter-firm knowledge sharing

## **Trust**

While participating in inter-firm knowledge sharing, information validity has always been an area of concern for firms. For example, optimal supply chain performance requires the manufacturer to share his initial forecasts truthfully. Yet, the manufacturer often has an incentive to inflate his forecasts to induce the supplier to build more capacity. The supplier is aware of this bias, and may not trust the manufacturer's forecasts, harming supply chain performance. As Zarley and Damore (1996) observe, in the personal computer industry, distributors frequently have better demand information than the manufacturers because they are closer to customers. To better manage their inventories, manufacturers would prefer the most accurate information possible. Unfortunately, they often suspect their distributors of submitting "phantom orders", forecasts of high future demand that do not always materialize. Complicating matters, it is difficult to accuse a distributor of lying. A distributor might have truly expected high demand, but random events could still lead to a low demand realization. Since the manufacturers do not trust the orders they receive from the distributors, there effectively is no exchange of market knowledge concerning demand forecasts.

Individual companies tend to be wary of getting too close to one another for fear of losing control, compromising trade secrets, proprietary information and even losing revenue and competitive edge. Trust is a big concern for supply webs.

As suggested by Madhok (1995) and Thorelli (1986), trust in inter-firm relationships includes a set of expectations between the partners regarding each other's behavior and each partner's fulfillment of its perceived obligations in light of such anticipation. Ganesan (1994) states that it is a willingness to rely on a party in whom one has confidence. A similar definition, the one adopted by this study, is **confidence in the reliability and integrity of the other party, and the ability to predict the actions of the other party in the relationship, as well as the belief that the other party will not act opportunistically when the opportunity arises** (Anderson and Narus 1990; Moorman, Deshpande and Zaltman 1993; Morgan and Hunt 1994).

Existing literature identifies three interrelated roles of trust in interorganizational exchanges. First, trust is an important deterrent to opportunistic behavior. When trust is embedded in the relationship, opportunistic behavior is unlikely to occur because partner firms will pass short term individual gains in favor of the long term interests of the partnership (Beamish and Bank 1987). Second, as Aulakh, Kotabe and Sahay (1997) observe, trust is considered a substitute for hierarchical governance, thus accomplishing organizational objectives in inter-firm partnerships when ownership-based control is not strategically viable or economically feasible. Unlike hierarchical exchanges, where formal authority structures based on ownership are used to enforce contractual obligations, trust-based interorganizational exchanges rely on mutuality of interests between partner firms (Dwyer, Schurr and Oh 1987). The literature discussed above

strongly points to the importance of trust achieving behavioral and performance objectives in interorganizational partnerships, especially in cross-border relationships where hierarchical control may not be a viable alternative.

In spite of the seemingly obvious benefits of trust and its role to alleviate some of the risks and dilemmas associated with knowledge sharing in a network setting, there have been on going debates among researchers on the value of trust in organizational exchange (Jap, 1999). Williamson (1993) contends that exchange relations are calculative and explains trust in terms of efficiency and credibility. Others concur that trust is ephemeral and may have little bearing on economic exchange (Barney and Hansen 1994; Ogilvy 1995).

Even with these potential liabilities, beliefs in the partner's trustworthiness are expected to be an important facilitator of inter-firm knowledge sharing activities. Individuals who trust each other are more willing to share relevant ideas and comprehensive information and clarify goals and problems and tend to approach the relationship with a problem-solving orientation (Bialeszewski and Giallourakis 1985; Moorman, Zaltman, and Deshpande 1992; Zand 1972). Hill (1990) explains that relationships devoid of trust will be less efficient due to the energies expended to focus on safeguarding activities necessary to check opportunism. Jap (1999)'s study concludes that trust is associated significantly with coordination effort (which includes knowledge sharing). Thus, we expect trust to facilitate inter-firm knowledge sharing activities.

H6: Trust has a positive effect on inter-firm knowledge sharing

## **The Moderating Effect of Cultural Distance**

Previous research has suggested that cultural differences cause managers from different countries or regions to emphasize different factors influencing the level of knowledge sharing with their exchange partners. First, cultural distance between the countries representing exchange partners influences managerial decision-making in a global business environment (Kogut and Singh 1988). Second, behavioral norms and work related values (Markoczy 2000) that are influenced by cultural differences cause disparity in the levels of both commitment to exchange partners and perceived satisfaction with exchange relationships.

Collectivism may moderate the relationship between dependence and relational governance (Roath, Miller and Cavusgil 2002). Relationships with exchange partners from collectivistic societies result in stronger, more intimate, and (thus) more loyal relationships than do relationships with exchange partners from individualistic societies (Bolton and Myers 2003). In addition, firms with long-term orientation are inclined to be more trusting, cooperative, and embrace similar norms and values (Anderson and Weitz 1992; Ganesan 1994; Morgant and Hunt 1994). All these cultural dimensions moderate how firms perceive buyer-seller collaboration, and have an effect on the level of inter-firm knowledge sharing.

As such, it is hypothesized that:

H7: The effects of environmental factor and interorganizational properties on inter-firm knowledge sharing are moderated by cultural distance

## **Performance**

Research related to organizational learning and market orientation has found strong links to competitive advantage and business performance (Hurley and Hult 1998; Jaworski and Kohli 1993; Matsuno and Mentzer 2000; Narver and Slater 1990). The association of effectiveness with inter-firm knowledge sharing is also supported (Dyer and Singh 1998, Selnes and Sallies 2003). In business markets where knowledge of value is considered critical and can be thought of as the cornerstone of marketing strategy (Anderson, Jain and Chintagunta 1993) and given the fundamental nature of value in business markets, it is critical for firms to gain an understanding of their offerings and to learn how they can be enhanced to continuously provide value to their industrial customers. In the long run, inter-firm knowledge sharing is likely to foster products and services that provide more value and are superior in solving problems for their users (von Hippel 1998). Powell, Koput and Smith-Doerr (1996) argue that “when the knowledge base of an industry is both complex and expanding, and the sources of expertise are widely dispersed, the locus of innovation will be found in networks of learning (i.e. inter-firm knowledge sharing), rather than in individual firms” (p. 116). It has been found that inter-firm knowledge sharing is most strongly related to superior product quality, an antecedent of superior customer value (Slater and Narver 2000).

Other research also suggests that as two organizations engage in mutual knowledge sharing, they are more likely to better understand each other’s needs and wants and to respond accordingly (Kalwani and Narayandas 1995). Market-driven organizations recognize that the responsibility for creating and delivering superior value does not lie within a firm across its different functional departments (Craven 1998).

Linked firms within supply chains share that same responsibility in coordination of value understanding, creation and delivery across the whole supply chain (Flint 2004). Thus, this study proposes that inter-firm knowledge sharing between customers and suppliers is the first step in value understanding, and should enhance the effectiveness and efficiency in value creation and delivery.

In a supply chain context, as proposed by Mentzer et al. (2001), the outcomes of purposively managing a supply chain are improved customer value and satisfaction, and profitability to achieve differential advantage. Lusch and Brown (1996) also suggest that firms working together in a supply chain pool their competencies, skills, and financial resources to achieve higher levels of performance than would be possible without such collaboration in their actions. Summing up, this study hypothesizes that:

H8: Inter-firm knowledge sharing has a positive effect on relationship value

H9: Inter-firm knowledge sharing has a positive effect on perceived supply chain performance

## **SUMMARY**

This chapter provided the theoretical justification from which the inter-firm knowledge sharing model was built. The theoretical justification was based on a review of literature from various disciplines. It provided justification for each of the constructs and their associated relationships that comprised the inter-firm knowledge sharing model. The hypotheses are summarized in Figure 2.5.

The following chapter describes the methodology used to test the research hypotheses.

**Facilitating conditions for inter-firm knowledge sharing:**

**H1:** Environmental uncertainty has a positive effect on inter-firm knowledge sharing

**H2:** The greater the degree of deviation in environmental fit between the buyer and seller's market environments, the higher the propensity for inter-firm knowledge sharing

**H3:** Organizational fit has a positive effect on inter-firm knowledge sharing

**H4:** Interdependence has a positive effect on inter-firm knowledge sharing

**H5:** Idiosyncratic investments have a positive effect on inter-firm knowledge sharing

**H6:** Trust has a positive effect on inter-firm knowledge sharing

**Moderator:**

**H7:** The effects of environmental factor and interorganizational properties on inter-firm knowledge sharing are moderated by cultural distance

**The effects of inter-firm knowledge sharing:**

**H8:** Inter-firm knowledge sharing has a positive effect on relationship value

**H9:** Inter-firm knowledge sharing has a positive effect on perceived supply chain performance

**Figure 2.5 Summary of Hypotheses**

## **CHAPTER THREE**

### **RESEARCH DESIGN AND MEASUREMENT**

#### **INTRODUCTION**

The conceptual model in Chapter Two depicts the hypothesized interrelationships between environmental factors, interorganizational characteristics, inter-firm knowledge sharing, and performance outcomes in a dyadic supply chain context. To test these relationships, empirical research was undertaken. This chapter covers an examination of the methodological issues related to the testing of the hypothesized conceptual model. Specific areas addressed include the research design, profile of the sampling frame, data collection, and development of instruments.

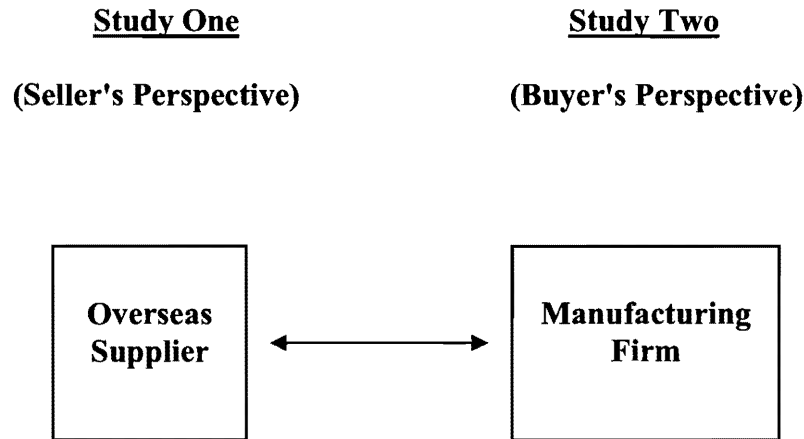
#### **RESEARCH DESIGN**

This dissertation uses a non-experimental survey methodology (Kerlinger and Lee 2000) to gather the data necessary to test the model and its hypotheses. Survey methodology will be used for the following reasons: 1) the hypothesized model does not lend itself to a study using secondary data; 2) surveys are appropriate for gathering a large number of perceptual data in a relatively cost-effective manner; 3) the research design will encompass a survey of paired dyads, which requires a survey-based matching methodology of independent buyers and sellers; 4) the large amount of cross-sectional data obtained from a survey permits quantification of responses in a way that allows statistical testing for significance of results; 5) survey research allows the use of existing measures developed in previous survey research; and 6) survey results are generalizable

to populations within the limitations of the sampling design. Combined, these factors indicate the use of a survey method and require scales to measure the focal constructs edited to fit the sample market context and dyadic position in the supply chain.

With the exception of environmental factors, the conceptual model is primarily concerned with interorganizational constructs – characteristics of the member firms involved. These constructs are unobservable, theoretical, shared constructions describing the member firms or the activities. As such, key informants were asked to provide the researcher with reports on observed measures in order to infer the nature of these interorganizational constructs. The key informant technique was originally associated with participant observation studies in ethnographic research (Lofland 1971). It was found to be a valid approach to study dyadic relationships (John and Reve 1982), and has been used in some important interorganizational studies (see Jap 1999, Selnes and Sallis 2003). Key informants are asked to explain and predict the behavior of organizations rather than individuals (Seidler 1974). Since their task is more complex, key informants are chosen on a non-random basis. They are typically chosen because they have special qualifications such as a particular status or specialized knowledge.

This study extended the paradigm beyond a single firm setting to include two companies directly linked by the downstream flows of products, services, finances, and information from a source to a customer. In order to provide a better understanding of the challenges faced by firms operating in a highly complex and globalized business environment, the study further extended the paradigm to investigate the hypothesized model in a cross-border context (see Figure 3.1).



**Figure 3.1 A Global Research Setting**

### **Unit of Analysis**

Since the goal of this study is to understand strategic relationship dynamics, the unit of analysis is the supply chain dyad. The intention of this study was to use the buyers and sellers as independent informants of the dyadic conceptual model. This did not presume nor require consensus across the dyad. The analytical approach explicitly accounted for this possibility, by allowing each side of the dyad to disclose its unique perception while still providing the desired insights regarding the nature and pattern of correlation between constructs. As a result, the measures used in this study were designed to tap aspects of the mutual relationship between the firms.

### **DATA COLLECTION**

#### **Sampling Procedure**

The structural model in this study was tested using a survey methodology on the procurement divisions of four manufacturing companies across different industries.

Multiple industries were used to increase the generalizability of the study (Shadish, Cook and Campbell 2002). Each firm was offered an executive summary of the results and customized analyses in return for its participation. Data were collected through Web surveys following guidelines suggested by Dillman (2000).

Participating firms were requested to submit a participant list consisted of the email contact of their procurement executives, as well as their corresponding overseas suppliers, to form a dyadic sample. Both buyers and sellers used the other as a reference point for completing their respective surveys, and their organizations as reference points for dyadic constructs. All participants were assured that their responses would remain confidential, and no individual's answers could be identified.

## **Implementation**

According to Dillman (2000), electronic survey methods have been able to offer greater efficiencies over the conventional paper and pencil questionnaires or telephone surveys. The advantages of web survey include: 1) the nearly complete elimination of paper, postage, mailing, and data entry costs; 2) the potential for overcoming international boundaries as significant barriers to conducting surveys; 3) the reduction in time required for survey implementation; and 4) the ability to provide a more dynamic interaction between respondent and questionnaire.

The Web survey in this study was constructed by a professional team following Dillman's principles (see Dillman 2000, p. 376-399). The survey plan was then implemented through a multiple-contact strategy for both the pre-test and the main study.

There were three to five contacts with each potential respondent, depending on the date of the respondent's reply. Potential respondents were first identified through pre-qualifying telephone calls. A cover letter was then sent via email that further explained the study and provided the Web site address. Those who did not log on to the Web site within one week were sent an e-mail reminder. This reminder was repeated up to three more times over the next four weeks. Altogether, as many as five contacts were made, over a period of about one month.

## **QUESTIONNAIRE AND SCALE DEVELOPMENT**

### **Item Generation**

The initial scales were developed using the technique recommended by Churchill (1979); Anderson and Gerbing (1991); and Mentzer and Flint (1997). A focused review of the literature was performed with emphasis placed on environmental factors, interorganizational characteristics, inter-firm knowledge sharing and performance. The review resulted in the identification of specific constructs that would assist in the measurement of the related phenomenon and model estimation. Tested scales exist for all the constructs studied in the analysis, except for relationship value which was developed following the literature review and Ulaga's (2003) grounded theory exploration through ten in-depth interviews with purchasing managers in nine manufacturing companies.

After the scales were selected, they were adjusted to fit the context of the study. Two versions were developed to suit the specific position of the respondents in the supply chain.

Seven-point bi-polar or Likert scales were developed to operationalize the individual constructs via statements such as “strong disagree” (1) to “strongly agree” (7). According to Dillman (1978), the use of Likert-type scales reduces the response costs to managers.

### **Academic Review**

Before the final study was conducted, the cover letter and questionnaire that contained the measurement items were reviewed by a team of academic experts, as suggested by Bienstock, Mentzer and Bird (1997). At this stage, academic experts are performing a partial test of content validity. Content validity assesses whether (1) the items are consistent with the theoretical domain of the construct; (2) the items are representative of the constructs the items are proposed to measure; and (3) the items are not difficult, ambiguous, or double-barreled statements.

### **Industry Review**

The questionnaire further went through a cognitive phase of pre-test. The cognitive pre-test was a review of the survey by several potential survey respondents to determine readability, item clarity and comprehension, ease-of-use, and time necessary to complete the survey (Dillman 2000). These participants were asked to complete a questionnaire that included the items, verify any ambiguity or other difficulties they may experience in responding to the items, and offer any suggestions to improve the questionnaire. Modifications to the statements were made according to the recommendations.

## **Pre-test with Managers**

The questionnaire then went through a data collection phase of pre-test. This involved administration of the measurement instrument to 30 marketing executives and 30 buyers from a MBA class at the University of Tennessee, after all revisions from the content validity and cognitive pre-test were incorporated. The purpose of this data collection phase of pre-test was to identify potential obstacles to the web survey administration, estimate response rates, evaluate data quality, and assess unidimensionality and reliability of the scales. Another important objective for this pre-test process was to reduce the number of items to a more manageable number. Potential benefits for doing so are multifaceted. One is that the length of the questionnaire can be reduced if the items are fewer. Second, the resulting parsimony of the constructs is not only theoretically important but also computationally desirable especially in applying the structural equation modeling technique. A related issue is the required size of the sample for structural equation models. One conventional rule of thumb suggested by Jöreskog and Sörbom (1993) is that the minimum sample size is a function of the number of free parameters to be estimated. Thus, the fewer the number of items, the smaller the sample size required for the study, which could be helpful if the response rate turns out to be lower than expected. Although these reasons support the idea of fewer items for each construct, it should be done so without sacrificing the breadth of the meaning of each construct. The ideal scales should adequately cover the breadth of the purported constructs with the least number of items.

## **Scale Purification**

Pre-test data were subjected to exploratory factor analysis to determine unidimensionality of the constructs, and reliability test to determine the degree to which the scales are free from error and are internally consistent. A scale is considered unidimensional when the items of the scale estimate one factor. If quantitative analysis indicates that a scale is improved when one item is deleted, that item will first be subjected to qualitative analysis to prevent premature deletion. Qualitative assessment of the items will draw on results of the content validity assessment through further literature reviews and academic expert reviews. If the content validity is judged adequate in spite of the statistical results, the item will remain. The scales will be evaluated a second time during data analysis for the main survey.

## **THE MEASUREMENT SCALES**

The incorporation of these scales into the two versions of the questionnaire is presented in Appendix B.

### **Inter-firm Knowledge Sharing**

Selnes and Sallies (2003) provide the most recent and complete battery to investigate the phenomenon of inter-firm knowledge sharing (termed relationship learning in their study). It is conceptualized as a capability of a relationship – a joint activity in which the two parties strive to create more value together than they would create individually or with other partners. It is believed that the capability of a relationship to learn is closely connected with how it is managed and the context in which it is embedded (Selnes and Sallies 2003). Their scale was developed through a review of

extant marketing and organizational learning literature (cf. Anderson and Narus 1990; Heide and John 1992; John, and Nevin 1990; Moorman and Miner 1997; Noordewier, Slater and Narver 1996), and through 26 in-depth interviews with informants from both sides of 13 buyer-seller dyads. The qualitative approach provided the researchers with better understanding of the phenomenon and some specific ideas about the measurement of the construct. The scale is a second-order scale with the three dimensions of: exchange of information, joint sense-making, and knowledge integration (see Table 3.1).

### **Environmental Uncertainty**

A four-item semantic differential scale that taps the variability of the market for the focal industry within the dyad is borrowed from Klein, Frazier and Roth (1990) and Ganesan (1994)'s Environmental Volatility scale. The same scale has also been recently adopted by Skarmeas, Katsikeas and Schlegelmilch (2002) in their study of drivers of commitment and its impact on performance in cross-cultural buyer-seller relationships. In addition, the Environmental Uncertainty scale of Jaworski and Kohli (1993) and Noordewier, John and Nevin (1990) has been considered and adapted in this study (see Table 3.2).

### **Environmental Fit**

In this study, environmental fit will be measured using a composite scale addressing stability of regulatory, economic conditions in the respondents' home market (see Table 3.3). The scales are adopted from studies conducted on foreign market channel integration (Aulakh and Kotabe 1997), cross-border marketing partnerships (Aulakh and

**Table 3.1 Inter-firm Knowledge Sharing**

|                                                                                                                                                                                                                                                                                                                                        |                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Definition:</b> a joint activity between a supplier and a customer in which the two parties share information, which is then jointly interpreted and integrated into a shared relationship-domain-specific memory that changes the range or likelihood of potential relationship-domain-specific behavior (Selles and Sallis 2003). |                                                                                                                            |
| ( Strongly Disagree = 1 to Strongly Agree = 7 )                                                                                                                                                                                                                                                                                        |                                                                                                                            |
| Exchange of Information KS01                                                                                                                                                                                                                                                                                                           | Our two firms exchange information on successful and unsuccessful experiences with products exchanged in the relationship. |
| Exchange of Information KS02                                                                                                                                                                                                                                                                                                           | Our two firms exchange information related to changes in end-user needs, preferences, and behavior.                        |
| Exchange of Information KS03                                                                                                                                                                                                                                                                                                           | Our two firms exchange information related to changes in market structure, such as mergers, acquisitions, or partnering.   |
| Exchange of Information KS04                                                                                                                                                                                                                                                                                                           | Our two firms exchange information related to changes in the technology of the focal products.                             |
| Exchange of Information KS05                                                                                                                                                                                                                                                                                                           | Our two firms exchange information as soon as any unexpected problems arise.                                               |
| Exchange of Information KS06                                                                                                                                                                                                                                                                                                           | Our two firms exchange information related to changes in the two organizations' strategies and policies.                   |
| Exchange of Information KS07                                                                                                                                                                                                                                                                                                           | Our two firms exchange information that is sensitive for both parties, such as financial performance and company know-how. |
| Joint Sense-Making KS08                                                                                                                                                                                                                                                                                                                | It is common to establish joint teams to solve operational problems in the relationship.                                   |
| Joint Sense-Making KS09                                                                                                                                                                                                                                                                                                                | It is common to establish joint teams to analyze and discuss strategic issues.                                             |
| Joint Sense-Making KS10                                                                                                                                                                                                                                                                                                                | The atmosphere in the relationship stimulates productive discussion encompassing a variety of opinions.                    |
| Joint Sense-Making KS11                                                                                                                                                                                                                                                                                                                | We have a lot of face-to-face communication in this relationship.                                                          |
| Knowledge Integration KS12                                                                                                                                                                                                                                                                                                             | We frequently adjust our common understanding of end-user needs, preferences, and behavior.                                |
| Knowledge Integration KS13                                                                                                                                                                                                                                                                                                             | We frequently adjust our common understanding of trends in technology related to our business.                             |
| Knowledge Integration KS14                                                                                                                                                                                                                                                                                                             | We frequently evaluate and, if needed, adjust our routines in order-delivery processes.                                    |
| Knowledge Integration KS15                                                                                                                                                                                                                                                                                                             | We frequently evaluate and, if needed, update the formal contracts in our relationship.                                    |
| Knowledge Integration KS16                                                                                                                                                                                                                                                                                                             | We frequently meet face-to-face in order to refresh the personal network in this relationship                              |
| Knowledge Integration KS17                                                                                                                                                                                                                                                                                                             | We frequently evaluate and, if needed, update information about the relationship stored in our electronic databases.       |

**Table 3.2 Environmental Uncertainty**

|                                                                                                                                      |                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Definition:</b> the degree of market volatility and unpredictability faced by a firm or a particular group (Heide and John 1988). |                                                                                 |
| EU01                                                                                                                                 | Our company's market share is: (Stable = 1 to Volatile = 7)                     |
| EU02                                                                                                                                 | Overall industry sales volume is: (Stable = 1 to Volatile = 7)                  |
| EU03                                                                                                                                 | Sales forecasts are: (Accurate = 1 to Inaccurate = 7)                           |
| EU04                                                                                                                                 | Change in end-user needs and preferences is: (Slow =1 to Rapid = 7)             |
| EU05                                                                                                                                 | The nature of competition is: (easy to predict = 1 to difficult to predict = 7) |

**Table 3.3 Environmental Fit**

|                                                                                                                                                                                                                                                                                                            |                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Definition:</b> the degree of adherence to an externally specified profile (Venkatraman 1989). In this study, it is operationalized as the degree of deviation between the buyer and seller's perceived home market environmental profiles in terms of stability in regulatory and economic conditions. |                                                                                                       |
| EF01                                                                                                                                                                                                                                                                                                       | Degree of volatility of regulations within the market (low=1 to high=7)                               |
| EF02                                                                                                                                                                                                                                                                                                       | Degree to which regulations affect profitability (low=1 to high=7)                                    |
| EF03                                                                                                                                                                                                                                                                                                       | Degree of government intervention in the industry (low=1 to high=7)                                   |
| EF04                                                                                                                                                                                                                                                                                                       | Predictability of the inflation rate in your country (very unpredictable=1 to very predictable=7)     |
| EF05                                                                                                                                                                                                                                                                                                       | Currency exchange rate fluctuations in your country (very unpredictable=1 to very predictable=7)      |
| EF06                                                                                                                                                                                                                                                                                                       | Remittances and repatriation regulations in your country (very unpredictable=1 to very predictable=7) |
| EF07                                                                                                                                                                                                                                                                                                       | Overall economic conditions in your country (very unpredictable=1 to Very predictable=7)              |

Kotabe 1996), foreign entry mode choice (Kim and Huang 1992), cross-cultural buyer-seller relationships (Skarmeas, Katsikeas and Schlegelmilch 2002), and fit to home and foreign market environments (Myers, Droge and Cheung 2004). Some items have been adapted to suit the context of this study that deals with both global sourcing (see Cavusgil, Yaprak and Yeoh 1993; Kotabe and Swan 1994), and global market expansion challenges.

In testing H2, we calculate the Euclidean distance of each dyad, as follows:

Degree of deviation in environmental fit between buyer and seller =

$$\sqrt{\sum_j (X_{sj} - X_{bj})^2}$$

where:

$X_{bj}$  = the score for a buyer in the study sample on the  $j$ th dimension

$X_{sj}$  = the score for a seller in the study sample on the  $j$ th dimension

$j$  = the number of environmental dimensions (1, 2, ..... 7)

This calculation provides a profile deviation score that represents the degree to which the market environment profile of each firm is similar to that of the dyadic partner.

### **Organizational Fit**

Following previous work on partner fit or organizational fit, this construct is treated as a second order construct with two dimensions: complementarity and compatibility. The scale is adapted/adopted from Beamish (1987), Dyer and Singh (1998), Geringer (1988), Harrigan (1988), Jap (1999), Kale, Singh and Perlmutter (2000), Parkhe (1993) (see Table 3.4).

**Table 3.4 Organizational Fit**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <p><b>Complementarity</b> between partners refers to the lack of similarity or overlap between their core businesses or capabilities – the lower the similarity, the greater the complementarity (Moweery, Oxley and Silverman 1996). It is conceptualized as the extent to which each partner brings in unique strengths and resources of value to the business exchange.</p> <p><b>Compatibility</b> is defined as the congruence in organizational cultures and capabilities between partners that influences the extent to which partners are able to realize the synergistic potential of a relationship (Modhok and Tallman 1998). It is assessed in the following ways: operating strategy, corporate cultures, management styles, and goal congruence.</p> |                                                                                                                    |
| ( Strongly Disagree = 1 to Strongly Agree = 7)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                    |
| Complementarity CM01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | The resources brought into the transactions by each firm have been very valuable for the other.                    |
| Complementarity CM02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | The resources brought into the transactions by each firm have been significant in getting the job done.            |
| Complementarity CM03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Our two firms have separate abilities that, when combined, enable us to achieve goals beyond our individual reach. |
| Compatibility CP01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Between our firm and the supplier (or customer), we share common goals and objectives.                             |
| Compatibility CP02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | There is a match in our philosophies/approaches to business dealings.                                              |
| Compatibility CP03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | We share a similar corporate culture and management style.                                                         |

## **Interdependence**

The scale for interdependence is adapted from Buchanan (1992), and Lusch and Brown (1996) (see Table 3.5).

## **Idiosyncratic Investments**

The scale for idiosyncratic investments is adapted from Anderson and Weitz's (1992) work, and has been used by Jap (1999) (see Table 3.6).

## **Trust**

Trust is measured with five items adapted from the scales developed by Doney and Cannon (1997), Kumar, Scheer, and Steenkamp (1995), Morgan and Hunt (1994), and Zaheer, McEvily, and Perrone (1998). The same scale was adopted by Salnes and Sallies (2003) in their study on relationship learning (see Table 3.7).

## **Relationship Value**

Based upon Ulaga's (2003) grounded theory exploration through ten in-depth interviews with purchasing managers in nine manufacturing companies, this study adapts the eight value drivers and develops the following scale to measure relationship value in a buyer-seller relationship to suit the dyadic context of current study. Table 3.8 (a) shows the version to be answered by the buyer, and Table 3.8 (b) shows the version for the seller and it is meant to tap the perception of the seller on how much value is received by their business customer in the same setting. The purpose is to allow us to gain deeper understanding of the different perceptions by different players in the same supply chain on the concept of value created for customers out of inter-firm knowledge sharing.

**Table 3.5 Interdependence**

|                                                                                                                                                                                                    |                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>Definition:</b> the bilateral perception of the need of each party for the other in an exchange relationship to achieve desired goals.<br>( Strongly Disagree = 1    to    Strongly Agree = 7 ) |                                                              |
| ID01                                                                                                                                                                                               | We are dependent on one another.                             |
| ID02                                                                                                                                                                                               | It would be difficult for either party to replace the other. |
| ID03                                                                                                                                                                                               | It would be costly for either party to lose the other.       |

**Table 3.6 Idiosyncratic Investments**

|                                                                                                                                                                            |                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Definition:</b> nonfungible investments that uniquely support the buyer-seller relationship (Williamson 1985).<br>( Strongly Disagree = 1    to    Strongly Agree = 7 ) |                                                                                                                                            |
| IV01                                                                                                                                                                       | If this relationship were to end, both firms would waste a lot of knowledge that is tailored to this relationship.                         |
| IV02                                                                                                                                                                       | If either firm were to switch to a competitive buyer or vendor, they would lose a lot of the investments made in the present relationship. |
| IV03                                                                                                                                                                       | Both firms have invested a great deal in building up their joint business.                                                                 |

**Table 3.7 Trust**

|                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Definition:</b> confidence in the reliability and integrity of the other party, and the ability to predict the actions of the other party in the relationship, as well as the belief that the other party will not act opportunistically when the opportunity arises (Anderson and Narus 1990; Moorman, Deshpande and Zaltman 1993; Morgan and Hunt 1994). |                                                                                                                                |
| ( Strongly Disagree = 1    to    Strongly Agree = 7 )                                                                                                                                                                                                                                                                                                         |                                                                                                                                |
| TS01                                                                                                                                                                                                                                                                                                                                                          | We believe the supplier (or the customer) will respond with understanding in the event of problems.                            |
| TS02                                                                                                                                                                                                                                                                                                                                                          | We trust that the supplier (or the customer) is able to fulfill contractual agreements.                                        |
| TS03                                                                                                                                                                                                                                                                                                                                                          | We trust that the supplier (or the customer) is competent at what they are doing.                                              |
| TS04                                                                                                                                                                                                                                                                                                                                                          | There is general agreement in my organization that this supplier (or the customer) is trustworthy.                             |
| TS05                                                                                                                                                                                                                                                                                                                                                          | There is general agreement in my organization that the contact people in this supplier (or the customer) firm are trustworthy. |

**Table 3.8 Relationship Value  
(a) (Buyer's Perspective)**

|                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Definition:</b> The difference between the benefits and the sacrifice (the total costs, both monetary and non-monetary) <i>perceived by customers</i> in terms of their expectations, i.e. needs and wants (Day 1990; Hass 1995; Mazumdar 1993; Narver and Slater 1990; Ravald and Gronroos 1996; Slater 1996, 1997; Slater and Narver 1992; Zeithaml 1988).<br><br>( Strongly Disagree = 1    to    Strongly Agree = 7 ) |                                                                                                                              |
| BRV01                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has helped improve their product performance.                                            |
| BRV02                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has helped improve their product reliability and consistency.                            |
| BRV03                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has helped lower product return rates on our orders with them.                           |
| BRV04                                                                                                                                                                                                                                                                                                                                                                                                                        | We have been able to obtain satisfactory product quality from this supplier.                                                 |
| BRV05                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has resulted in more efficient communication between the two parties.                    |
| BRV06                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has helped improve our problem solving.                                                  |
| BRV07                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has helped us better understand each other's goals.                                      |
| BRV08                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has resulted in improved on-time delivery of the orders we place with them.              |
| BRV09                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has resulted in improved delivery flexibility of the orders we place with them.          |
| BRV10                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has resulted in improved accuracy of delivery of the orders we place with them.          |
| BRV11                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has a positive effect on our ability to develop successful new products for our markets. |
| BRV12                                                                                                                                                                                                                                                                                                                                                                                                                        | Our relationship with this supplier has a positive effect on our ability to make improvements to our existing products.      |
| BRV13                                                                                                                                                                                                                                                                                                                                                                                                                        | We have been able to obtain competitive prices from this supplier.                                                           |
| BRV14                                                                                                                                                                                                                                                                                                                                                                                                                        | Our investments of resources in this relationship, such as time, effort and money, have paid off very well.                  |

**Table 3.8 Continued**  
**(b) (Seller's Perspective)**

|                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Definition:</b> The difference between the benefits and the sacrifice (the total costs, both monetary and non-monetary) <i>perceived by sellers</i> in terms of their expectations, i.e. needs and wants (Day 1990; Hass 1995; Mazumdar 1993; Narver and Slater 1990; Ravald and Gronroos 1996; Slater 1996, 1997; Slater and Narver 1992; Zeithaml 1988).<br><br>( Strongly Disagree = 1    to    Strongly Agree = 7 ) |                                                                                                                              |
| SRV01                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has helped improve our product performance.                                              |
| SRV02                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has helped improve our product reliability and consistency.                              |
| SRV03                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has helped lower product return rates on their orders with us.                           |
| SRV04                                                                                                                                                                                                                                                                                                                                                                                                                      | This customer has been able to obtain satisfactory product quality from us.                                                  |
| SRV05                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has resulted in more efficient communication between the two parties.                    |
| SRV06                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has helped improve our problem solving.                                                  |
| SRV07                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has helped us better understand each other's goals.                                      |
| SRV08                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has resulted in improved on-time delivery of their orders.                               |
| SRV09                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has resulted in improved delivery flexibility of their orders.                           |
| SRV10                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has resulted in improved accuracy of delivery of their orders.                           |
| SRV11                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has a positive effect on our ability to develop successful new products for our markets. |
| SRV12                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has a positive effect on their ability to make improvements to our existing products.    |
| SRV13                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has helped us remain competitive in our pricing.                                         |
| SRV14                                                                                                                                                                                                                                                                                                                                                                                                                      | Our relationship with this customer has helped us reduce our costs.                                                          |
| SRV15                                                                                                                                                                                                                                                                                                                                                                                                                      | Our investments of resources in this relationship, such as time, effort and money, have paid off very well.                  |

## Perceived Supply Chain Performance

In the strategic management and marketing literature, firm performance mostly has been measured using a subjective approach (Golden 1992; Verhage and Waarts 1988). However, some researchers have taken both an objective and subjective approach and found a strong correlation between subjective and objective responses (Dess and Robinson 1984; Robinson and Pearce 1988; Venktraman and Ramanujam 1986). In this study, supply chain performance is measured on a Likert scale to tap a respondent's interpretation of the level of improvement in market share and profitability of his/her firm, as well as the partnering firm. The scale is adopted from McCarthy (2003) on the role of marketing in bridging the gap between demand and supply chain management (see Table 3.9).

**Table 3.9 Perceived Supply Chain Performance**

|                                                                                                                                                                                                                                                              |                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Scale: 7-point Likert scale ranging from (1) Greatly Declined to (7) Greatly Improved. For each of the metrics below, respondents will be asked to indicate the degree to which performance has improved or declined over the lifetime of this relationship. |                                                      |
| ( Strongly Disagree = 1    to    Strongly Agree = 7 )                                                                                                                                                                                                        |                                                      |
| SP01                                                                                                                                                                                                                                                         | Market share for my firm                             |
| SP02                                                                                                                                                                                                                                                         | Market share for this supplier (or customer)         |
| SP03                                                                                                                                                                                                                                                         | Sales for my firm                                    |
| SP04                                                                                                                                                                                                                                                         | Sales for this supplier (or customer)                |
| SP05                                                                                                                                                                                                                                                         | Return on sales for my firm                          |
| SP06                                                                                                                                                                                                                                                         | Return on sales for this supplier (or customer)      |
| SP07                                                                                                                                                                                                                                                         | Return on investment for my firm                     |
| SP08                                                                                                                                                                                                                                                         | Return on investment for this supplier (or customer) |

## **Moderator – Cultural Distance**

In general terms, a moderator is a variable that has an effect on the direction and/or strength of the relation between an independent and a dependent variable (Baron and Kenny 1986). In this study, it is hypothesized that the effects of environmental factors and interorganizational properties on inter-firm knowledge sharing are moderated by *cultural distance* between the two countries in which the facilities of the supplier and the buyer are located.

Cultural distance is derived from the work of Hofstede (1980, 2001). Hofstede (1980, 2001) developed by far the most influential national cultural framework through a combination of empirical and eclectic analyses (Steenkamp 2001). The framework identifies five main dimensions along which dominant value systems in 70 countries can be ordered and that affect human thinking, feeling, and acting, as well as organizations and institutions, in predictable ways. The five dimensions of cultural variation are: uncertainty avoidance, individualism versus collectivism, power distance, masculinity versus femininity, and long term versus short term orientation (see Table 3.10). They showed significant and meaningful correlations with geographic, economic, demographic, and political national indicators (Hofstede, 2001); and have been applied to investigate a number of marketing and interorganizational issues. Index scores have been validated across different studies. Ratings of 70 countries on these dimensions are readily available for comparison and clustering (see Hofstede 2001, p. 499-502). They have been useful in international business studies (see Doney, Cannon and Mullen 1998; Money 1998; Steenkamp 2001; Steenkamp, Hofstede and Wedel 1999 etc.)

**Table 3.10 Hofstede's Five Dimensions of Cultural Variation**

| <b>The Five Dimensions</b>               | <b>Definition</b>                                                                                                          | <b>Associated Societal Norms and Values<sup>4</sup></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Uncertainty Avoidance</b>             | The extent to which a culture programs its members to feel either uncomfortable or comfortable in unstructured situations. | <p><b>High uncertainty avoidance</b><br/>           Need for structure (formal rules and relations)<br/>           Human behavior is purposive<br/>           Strong faith in institutions<br/>           Belief in experts and their knowledge</p> <p><b>Low uncertainty avoidance</b><br/>           High tolerance for deviance<br/>           Human behavior is unpredictable<br/>           Norm for conflict<br/>           Weak faith in people and institutions</p>                                                                                                                                                                                                                                      |
| <b>Individualism versus Collectivism</b> | The degree to which individuals are supposed to look after themselves or remain integrated into groups.                    | <p><b>Individualism</b><br/>           "I" consciousness (self-orientation)<br/>           Value individual accomplishment<br/>           Tolerate individual behavior and opinion<br/>           Low loyalty to other people and institutions<br/>           Interact on an individual, competitive basis<br/>           Loose interpersonal ties</p> <p><b>Collectivism</b><br/>           "We" consciousness (group orientation)<br/>           Value joint efforts and group rewards<br/>           Norms for behavioral conformity<br/>           High loyalty to other people and institutions<br/>           Interact in an interdependent, cooperative mode<br/>           Strong interpersonal ties</p> |

<sup>4</sup> Developed using Doney, Cannon and Mullen (1998)

**Table 3.10 Continued**

| <b>The Five Dimensions</b>           | <b>Definition</b>                                                                                                                      | <b>Associated Societal Norms and Values</b>                                                                                                                                                                                                                                                                                                                |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Power Distance</b>                | The extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally. | <p><b>High power distance</b><br/>           Norms for differential prestige, power, wealth<br/>           Norm for conflict<br/>           Authoritarian norm</p> <p><b>Low power distance</b><br/>           Egalitarian relationships prevail<br/>           Norm for cooperation<br/>           Norms for interdependence, solidarity, affiliation</p> |
| <b>Masculinity versus Femininity</b> | The distribution of emotional roles between the genders                                                                                | <p><b>Masculinity</b><br/>           Value individual achievement<br/>           Norm for confrontation<br/>           Norms for independent thought and action</p> <p><b>Femininity</b><br/>           Norms for solidarity and service<br/>           Norm for cooperation<br/>           Social norms honoring moral obligation</p>                     |

**Table 3.10 Continued**

| <b>The Five Dimensions</b>                     | <b>Definition</b>                                                                                                                 | <b>Associated Societal Norms and Values</b>                                                                                                                                                                                                                                                                               |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Long Term versus Short Term Orientation</b> | The extent to which a culture programs its members to accept delayed gratification of their material, social and emotional needs. | <p><b>Long Term Orientation</b></p> <p>Norm for long-term horizons<br/> Persistence, perseverance<br/> Personal adaptability<br/> Adaptation of traditions to new circumstances</p> <p><b>Short Term Orientation</b></p> <p>Quick results expected<br/> Respect for traditions<br/> Personal steadiness and stability</p> |

Following Kogut and Singh (1988), this study used Hofstede's indices to form a composite index (CD) based upon the deviation along each of the four cultural dimensions (i.e., power distance, uncertainty avoidance, masculinity/femininity, and individualism) between the two countries in which the buyer and seller's facilities were located. The fifth dimension (long/short term orientation) could not be used as 41% of the countries in the study have not been assigned an index on this dimension in Hofstede's most recent study (2001). Algebraically, the index was built as follows:

$$CD_{bs} = \sum_{i=1}^4 \left\{ (I_{ib} - I_{is})^2 / V_i \right\} / 4$$

Where  $I_i$  stands for the index for the  $i^{\text{th}}$  cultural dimension, and  $b$  indicates the buyer country,  $V_i$  is the variance of the index of the  $i^{\text{th}}$  dimension,  $s$  indicates the supplier country, and  $CD_{bs}$  is the cultural distance between the buyer country and the seller country.

In order to test the moderating effect of cultural distance, the data were grouped and treated as categorical data. Splitting the data into two groups permitted analysis of the moderating effect of cultural distance on the influences of environmental factors and interorganizational properties on inter-firm knowledge sharing under two conditions relevant to this study: high cultural distance and low cultural distance.

This study only tests one umbrella hypothesis on the moderating effect of national/regional characteristics on the relationship between environmental factors/interorganizational properties and inter-firm knowledge sharing. We leave it for future research to explore the specific effects of each different cultural dimension on the relationship between the predictor variables and inter-firm knowledge sharing.

### **Descriptive Measures**

There were several variables not directly associated with the testing of the hypotheses but included in the survey instrument. These variables included knowledgeability of the respondent, length of relationship, significance of the sales/purchases, and responding firms' size of business. These descriptive measures were used for classification and comparison purposes.

To check for knowledgeability, respondents were asked to report on their level of knowledge about their firm's relationship with the partner concerned, the number of years' experience in the job, and their job title.

Lengths of relationship were measured by asking the respondents to indicate the number of years the two firms have been doing business together.

Significance of the sales/purchases were estimated by asking the respondents to indicate the approximate percentage of sales/purchases the firm concluded with the focal firm/supplier, out of the firm's total annual sales/purchases in that product category.

Responding firms' size of business were measured by asking the respondents to indicate the level of the firms' approximate annual sales revenue in U.S. dollars on a categorical scale where: (1) represents less than \$10 million, (2) \$10 – \$50 million, (3) \$51 – \$500 million, (4) \$500 million - \$1 billion, (5) greater than \$ 1 billion.

Please refer to Appendix B for the survey items for both the pre-test and the final survey.

### **Language Differences**

The original questionnaire was in English. In the event that English was not used as the business language for the executives, we were prepared to offer a questionnaire that would be translated into their native language. All translation would be based on the English original, and back-translation would be made from the second language to English. We would then use one-way analysis of variance to test for differences between group means for key variables across languages.

In this study, English was used as the business language for all the respondents. No translation was requested by any respondent.

## **SURVEY PRE-TEST**

The data collection phase of the pre-test involved administration of the measurement instrument through a web-based survey to a group of MBA students in the University of Tennessee. Name lists were obtained from the MBA program administrator. Only students with previous or current working experience in the field of either purchasing/procurement/supply management or marketing/sales/customer relationship management were invited to participate in the pre-test. To encourage participation, an email explaining the purpose of the research was forwarded to these students by the MBA program administrator. In total, 30 participants responded in the pre-test for Study 1 (Seller), and 42 participants took part in the pre-test for Study 2 (Buyer), giving us a total of 71 completed surveys.

The purpose of this data collection phase of the pre-test was to identify potential obstacles to survey administration or completion, evaluate data quality, and assess unidimensionality and reliability of the scales used to operationalize the constructs. Results from this data collection were used to purify measures.

### **Missing Data Analysis**

Cases with missing values were examined, followed by evaluation of items with missing values. 80% of the pre-test respondents returned complete surveys. One survey with 10 missing responses was removed from further analysis. In total, the missing values accounted for less than one percent (0.2%) of all responses, and were replaced using EM method in SPSS, which uses an iterative process to estimate the means, covariance matrix and correlation of variables with missing values.

## **Descriptive Statistics**

The descriptive statistics for the pre-test are provided in Appendix A. The results show that the item results were not considered to be normal. This is understandable and expected due to the nature of the study. Most items obtained the full range of answers (from 1 to 7). Standard deviations for all items ranged from 0.906 to 2.051.

## **Scale Purification**

For Study 1, items were created to measure the respondents' (i.e., the sellers') perception of the interfirm relationship between their firm and a supplier. For Study 2, items were designed to measure the respondents' (i.e., the buyers') perception of the interfirm relationship between their firm and a customer. Item wordings for the following constructs were identical for both Study 1 and Study 2: Environmental Uncertainty, Environmental Fit, Complementarity, Compatibility, Trust, Interdependence, Idiosyncratic Investments, Exchange of Information, Joint Sense-making, Knowledge Integration, and Perceived Supply Chain Performance. Thus, it was considered appropriate to pool together the responses from Study 1 and Study 2, giving us a total responses of 71 to run a factor analysis for these constructs.

As for the construct Relationship Value, number of items and wording of the items were different in Study 1 and Study 2. Thus, factor analysis was conducted separately for Study 1 and Study 2.

Unidimensionality of each scale was assessed using exploratory factor analysis. The theoretical model contained two higher order constructs (Organizational Fit and

Interfirm Knowledge Sharing) and, as a result, initial purification steps evaluated the model sub-scales.

Exploratory factor analysis (using Principal Component Analysis extraction, and Varimax rotation method) found eight factors to explain 83.235% of the variance in the data, while 12 constructs were hypothesized (see Table 3.11). As opposed to the study by Selnes and Sallies (2003), the 17 items used to measure the construct Interfirm Knowledge Sharing in this pre-test did not load as 3 distinct sub-factors. Further tests will be needed to determine its second order construct nature when we conduct the final survey with a larger sample size.

Unidimensionality tests run on the individual constructs uncovered several items (EU04, EU05, CM01, CM03, CP02) that loaded poorly (less than or close to .50). Items measuring Idiosyncratic Investments loaded on the same factor measuring Inter-firm Knowledge Sharing. Similar findings occurred on the items measuring Complementarity and Trust.

Factor analysis was then run again using the respective number of theoretical factors on the constructs that showed cross loadings in exploratory factor analysis: Environmental Uncertainty, Environmental Fit, Complementarity, Compatibility, Interdependence, Idiosyncratic Investments and Trust. With this, the factor analysis produced much cleaner factor loadings (see Table 3.12). The only primary loading concerns were with the first three items in Environmental Fit. They seemed to load with the construct Environmental Uncertainty. These three items were meant to measure the environmental volatility caused by government regulation. It is understandable that there is a high correlation between this construct and Environmental Uncertainty. These

**Table 3.11 Exploratory Factor Analysis Loadings**

| <b>Component</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> |
|------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| KS01             | .843     |          |          |          |          |          |          |          |
| KS02             | .834     |          |          |          |          |          |          |          |
| KS03             | .755     |          |          |          |          |          |          |          |
| KS04             | .852     |          |          |          |          |          |          |          |
| KS05             | .658     |          |          |          |          |          |          |          |
| KS06             | .786     |          |          |          |          |          |          |          |
| KS07             | .681     |          |          |          |          |          |          |          |
| KS08             | .742     |          |          |          |          |          |          |          |
| KS09             | .747     |          |          |          |          |          |          |          |
| KS10             | .788     |          |          |          |          |          |          |          |
| KS11             | .804     |          |          |          |          |          |          |          |
| KS12             | .830     |          |          |          |          |          |          |          |
| KS13             | .778     |          |          |          |          |          |          |          |
| KS14             | .830     |          |          |          |          |          |          |          |
| KS15             | .751     |          |          |          |          |          |          |          |
| KS16             | .795     |          |          |          |          |          |          |          |
| KS17             | .736     |          |          |          |          |          |          |          |
| EU01             |          | .726     |          |          |          |          |          |          |
| EU02             |          | .680     |          |          |          |          |          |          |
| EU03             |          | .691     |          |          |          |          |          |          |
| EU04             | .541     | .580     |          |          |          |          |          |          |
| EU05             | .500     | .481     |          |          |          |          |          |          |
| EF01             |          | .647     |          |          |          |          |          |          |
| EF02             |          |          | .662     |          |          |          |          |          |
| EF03             |          |          | .761     |          |          |          |          |          |
| EF04             |          |          |          | .882     |          |          |          |          |
| EF05             |          |          |          | .922     |          |          |          |          |
| EF06             |          |          |          | .886     |          |          |          |          |
| EF07             |          |          |          | .910     |          |          |          |          |
| CM01             | .420     |          |          |          | .466     |          |          |          |
| CM02             |          |          |          |          | .613     |          |          |          |
| CM03             | .418     |          |          |          | .453     |          | .416     |          |
| CP01             | .466     |          |          |          | .417     |          |          |          |
| CP02             | .452     |          |          |          |          |          |          |          |
| CP03             | .392     |          |          |          |          | .708     |          |          |
| ID01             |          |          |          |          |          |          | .677     |          |
| ID02             |          |          |          |          |          |          | .796     |          |
| ID03             |          |          |          |          |          |          | .668     |          |
| IV01             | .696     |          |          |          |          |          | .461     |          |

**Table 3.11 Continued**

| <b>Component</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> |
|------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| IV02             | .625     |          |          |          |          |          | .456     |          |
| IV03             | .655     |          |          |          |          |          |          |          |
| TS01             |          |          |          |          | .675     |          |          |          |
| TS02             |          |          |          |          | .788     |          |          |          |
| TS03             |          |          |          |          | .790     |          |          |          |
| TS04             |          |          |          |          | .881     |          |          |          |
| TS05             |          |          |          |          | .907     |          |          |          |
| SP01             |          |          |          |          |          |          |          | .685     |
| SP02             |          |          |          |          |          |          |          | .824     |
| SP03             |          |          |          |          |          |          |          | .640     |
| SP04             |          |          |          |          |          |          |          | .809     |
| SP05             |          |          |          |          |          |          |          | .762     |
| SP06             |          |          |          |          |          |          |          | .872     |
| SP07             |          |          |          |          |          |          |          | .725     |
| SP08             |          |          |          |          |          |          |          | .858     |

**Table 3.12 - Factor Loadings**  
(Using respective number of theoretical factors)

| <b>Variable</b> | <b>Env.<br/>Uncertainty</b> | <b>Env.<br/>Fit</b> | <b>Comple-<br/>mentarity</b> | <b>Compat-<br/>ibility</b> | <b>Inter-<br/>dependence</b> | <b>Idio.<br/>Invest-<br/>ments</b> | <b>Trust</b> |
|-----------------|-----------------------------|---------------------|------------------------------|----------------------------|------------------------------|------------------------------------|--------------|
| EU01            | .921                        |                     |                              |                            |                              |                                    |              |
| EU02            | .916                        |                     |                              |                            |                              |                                    |              |
| EU03            | .888                        |                     |                              |                            |                              |                                    |              |
| EU04            | .853                        |                     |                              |                            |                              |                                    |              |
| EU05            | .859                        |                     |                              |                            |                              |                                    |              |
| EF01            | .878                        |                     |                              |                            |                              |                                    |              |
| EF02            | .753                        |                     |                              |                            |                              |                                    |              |
| EF03            | .700                        |                     |                              |                            |                              |                                    |              |
| EF04            |                             | .892                |                              |                            |                              |                                    |              |
| EF05            |                             | .905                |                              |                            |                              |                                    |              |
| EF06            |                             | .870                |                              |                            |                              |                                    |              |
| EF07            |                             | .915                |                              |                            |                              |                                    |              |
| CM01            |                             |                     | .675                         |                            |                              |                                    |              |
| CM02            |                             |                     | .630                         |                            |                              |                                    |              |
| CM03            |                             |                     | .730                         |                            |                              |                                    |              |
| CP01            |                             |                     |                              | .676                       |                              |                                    |              |
| CP02            |                             |                     |                              | .744                       |                              |                                    |              |
| CP03            |                             |                     |                              | .559                       |                              |                                    |              |
| ID01            |                             |                     |                              |                            | .666                         |                                    |              |
| ID02            |                             |                     |                              |                            | .695                         |                                    |              |
| ID03            |                             |                     |                              |                            | .804                         |                                    |              |
| IV01            |                             |                     |                              |                            |                              | .830                               |              |
| IV02            |                             |                     |                              |                            |                              | .871                               |              |
| IV03            |                             |                     |                              |                            |                              | .817                               |              |
| TS01            |                             |                     |                              |                            |                              |                                    | .708         |
| TS02            |                             |                     |                              |                            |                              |                                    | .820         |
| TS03            |                             |                     |                              |                            |                              |                                    | .792         |
| TS04            |                             |                     |                              |                            |                              |                                    | .920         |
| TS05            |                             |                     |                              |                            |                              |                                    | .919         |

should either be removed or be given extra attention in final data analysis when we have a larger sample size. The remaining items loaded according to their respective factors, all with a loading of 0.60 and above.

As for Relationship Value, factor analysis showed that all the items created to measure the construct loaded on one single factor in both Study 1 and Study 2 (see Table 3.13 and Table 3.14).

### **Reliability Test**

After establishing unidimensionality of each of the scales, construct reliability was assessed by calculating Cronbach's Coefficient Alpha. Results for each scale are reported in Tables 3.15 to 3.38.

### **Pre-Test Conclusions**

Based upon the results reported, it was suggested that all items be retained for the final survey. The Environmental fit scale did pose some problems in the pre-test. However, it was one of the key constructs in the study and needed to be retained for closer examination in the main study.

### **SUMMARY**

In this chapter the research methodology that would be used to test the research hypotheses was discussed. It also addressed specific areas including the research design, profile of the sampling frame, development of instruments, measurement concerns, data collection, and psychometric concerns. A pre-test was conducted on a smaller sample to test and refine the survey measures. Chapter 4 presents the results of the data analysis

**Table 3.13 Study One (Seller) – Exploratory Factor Analysis  
For the Construct Relationship Value**

**Component Matrix**

|       | Component<br>1 |
|-------|----------------|
| SRV01 | .887           |
| SRV02 | .911           |
| SRV03 | .886           |
| SRV04 | .856           |
| SRV05 | .907           |
| SRV06 | .865           |
| SRV07 | .881           |
| SRV08 | .868           |
| SRV09 | .884           |
| SRV10 | .788           |
| SRV11 | .871           |
| SRV12 | .880           |
| SRV13 | .769           |
| SRV14 | .734           |
| SRV15 | .864           |

Extraction Method: Principal Component Analysis.  
1 components extracted.

**Table 3.14 - Study Two (Buyer) – Exploratory Factor Analysis  
For the Construct Relationship Value**

**Component Matrix**

|       | Component<br>1 |
|-------|----------------|
| BRV01 | .840           |
| BRV02 | .876           |
| BRV03 | .946           |
| BRV04 | .939           |
| BRV05 | .919           |
| BRV06 | .929           |
| BRV07 | .948           |
| BRV08 | .963           |
| BRV09 | .938           |
| BRV10 | .960           |
| BRV11 | .976           |
| BRV12 | .966           |
| BRV13 | .835           |
| BRV14 | .967           |

Extraction Method: Principal Component Analysis.  
1 components extracted

**Table 3.15 Inter-firm Knowledge Sharing  
Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .981             | .981                                         | 17         |

**Table 3.16 Inter-firm Knowledge Sharing  
Item-Total Statistics**

|      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| KS01 | 76.89                      | 661.838                        | .798                             | .900                         | .981                             |
| KS02 | 76.97                      | 659.298                        | .814                             | .887                         | .981                             |
| KS03 | 77.69                      | 655.125                        | .837                             | .827                         | .980                             |
| KS04 | 77.13                      | 652.901                        | .872                             | .887                         | .980                             |
| KS05 | 76.64                      | 664.011                        | .820                             | .731                         | .981                             |
| KS06 | 77.42                      | 653.439                        | .849                             | .858                         | .980                             |
| KS07 | 77.86                      | 652.574                        | .792                             | .816                         | .981                             |
| KS08 | 77.13                      | 651.451                        | .851                             | .847                         | .980                             |
| KS09 | 77.20                      | 648.117                        | .872                             | .883                         | .980                             |
| KS10 | 77.27                      | 651.024                        | .907                             | .890                         | .980                             |
| KS11 | 76.93                      | 642.704                        | .891                             | .936                         | .980                             |
| KS12 | 77.02                      | 640.136                        | .929                             | .938                         | .979                             |
| KS13 | 77.21                      | 643.304                        | .896                             | .926                         | .980                             |
| KS14 | 77.04                      | 654.405                        | .888                             | .890                         | .980                             |
| KS15 | 77.69                      | 651.865                        | .879                             | .865                         | .980                             |
| KS16 | 76.95                      | 645.558                        | .884                             | .930                         | .980                             |
| KS17 | 77.21                      | 645.367                        | .866                             | .862                         | .980                             |

**Table 3.17 Environmental Uncertainty  
Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .961             | .961                                         | 5          |

**Table 3.18 Environmental Uncertainty  
Item-Total Statistics**

|      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| EU01 | 17.30                      | 52.183                         | .945                             | .926                         | .942                             |
| EU02 | 17.15                      | 51.676                         | .923                             | .896                         | .945                             |
| EU03 | 16.85                      | 51.990                         | .889                             | .823                         | .951                             |
| EU04 | 16.90                      | 53.119                         | .851                             | .739                         | .958                             |
| EU05 | 16.76                      | 55.413                         | .838                             | .709                         | .959                             |

**Table 3.19 Environmental Fit  
Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .404             | .435                                         | 7          |

**Table 3.20 Environmental Fit  
Item-Total Statistics**

|      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| EF01 | 25.58                      | 34.447                         | -.066                            | .561                         | .494                             |
| EF02 | 25.34                      | 32.598                         | .011                             | .848                         | .458                             |
| EF03 | 25.44                      | 31.135                         | .057                             | .814                         | .439                             |
| EF04 | 25.48                      | 27.596                         | .315                             | .795                         | .296                             |
| EF05 | 25.51                      | 25.968                         | .403                             | .774                         | .244                             |
| EF06 | 25.52                      | 28.767                         | .277                             | .817                         | .320                             |
| EF07 | 25.45                      | 26.594                         | .391                             | .875                         | .256                             |

**Table 3.21 Environmental Fit\*  
Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .946             | .946                                         | 4          |

**Table 3.22 Environmental Fit\*  
Item-Total Statistics**

|      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| EF04 | 12.68                      | 24.308                         | .847                             | .765                         | .937                             |
| EF05 | 12.70                      | 23.726                         | .872                             | .766                         | .929                             |
| EF06 | 12.72                      | 25.120                         | .848                             | .789                         | .936                             |
| EF07 | 12.65                      | 23.746                         | .916                             | .858                         | .915                             |

\*Note: With the first three items (EF01, EF02 and EF03) deleted, the scale reliability for Environmental Fit increased dramatically (see Table 3.21 and 3.22)

**Table 3.23 Complementarity  
Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .883             | .887                                         | 3          |

**Table 3.24 Complementarity  
Item-Total Statistics**

|      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| CM01 | 11.28                      | 7.005                          | .758                             | .616                         | .847                             |
| CM02 | 11.17                      | 7.257                          | .838                             | .705                         | .786                             |
| CM03 | 11.21                      | 6.626                          | .737                             | .568                         | .873                             |

**Table 3.25 Compatibility  
Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .892             | .895                                         | 3          |

**Table 3.26 Compatibility  
Item-Total Statistics**

|      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| CP01 | 8.87                       | 6.484                          | .789                             | .694                         | .845                             |
| CP02 | 9.11                       | 6.359                          | .860                             | .756                         | .787                             |
| CP03 | 9.48                       | 6.310                          | .724                             | .546                         | .907                             |

**Table 3.27 Interdependence  
Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .912             | .913                                         | 3          |

**Table 3.28 Interdependence  
Item-Total Statistics**

|      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| ID01 | 10.68                      | 12.079                         | .800                             | .645                         | .892                             |
| ID02 | 11.08                      | 9.878                          | .861                             | .743                         | .845                             |
| ID03 | 10.69                      | 11.903                         | .821                             | .685                         | .876                             |

**Table 3.29 Idiosyncratic Investments  
Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .965             | .965                                         | 3          |

**Table 3.30 Idiosyncratic Investments  
Item-Total Statistics**

|      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| IV01 | 9.99                       | 10.957                         | .910                             | .834                         | .960                             |
| IV02 | 9.99                       | 10.786                         | .946                             | .896                         | .933                             |
| IV03 | 9.94                       | 11.340                         | .920                             | .859                         | .952                             |

**Table 3.31 Trust  
Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .953             | .957                                         | 5          |

**Table 3.32 Trust  
Item-Total Statistics**

|      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| TS01 | 21.59                      | 19.616                         | .820                             | .681                         | .952                             |
| TS02 | 21.13                      | 19.855                         | .860                             | .761                         | .944                             |
| TS03 | 21.08                      | 18.964                         | .859                             | .752                         | .946                             |
| TS04 | 21.27                      | 20.570                         | .922                             | .940                         | .935                             |
| TS05 | 21.35                      | 20.660                         | .928                             | .941                         | .935                             |

**Table 3.33 Perceived Supply Chain Performance  
Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .940             | .940                                         | 8          |

**Table 3.34 Perceived Supply Chain Performance  
Item-Total Statistics**

|      | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| SP01 | 35.38                      | 35.210                         | .782                             | .932                         | .932                             |
| SP02 | 35.42                      | 34.790                         | .806                             | .941                         | .930                             |
| SP03 | 35.37                      | 34.635                         | .748                             | .870                         | .934                             |
| SP04 | 35.38                      | 33.668                         | .818                             | .899                         | .929                             |
| SP05 | 35.70                      | 33.754                         | .764                             | .942                         | .933                             |
| SP06 | 35.75                      | 33.621                         | .798                             | .952                         | .931                             |
| SP07 | 35.70                      | 34.497                         | .784                             | .909                         | .932                             |
| SP08 | 35.73                      | 34.342                         | .788                             | .943                         | .931                             |

**Table 3.35 Relationship Value - Study 1 (Seller)**  
**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .973             | .974                                         | 15         |

**Table 3.36 Relationship Value – Study 1 (Seller)**  
**Item-Total Statistics**

|       | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|-------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| SRV01 | 76.68                      | 282.222                        | .868                             | .936                         | .971                             |
| SRV02 | 76.80                      | 279.811                        | .895                             | .927                         | .970                             |
| SRV03 | 77.00                      | 270.350                        | .867                             | .833                         | .971                             |
| SRV04 | 76.54                      | 280.805                        | .830                             | .820                         | .971                             |
| SRV05 | 76.85                      | 274.428                        | .888                             | .900                         | .970                             |
| SRV06 | 76.73                      | 282.601                        | .839                             | .860                         | .971                             |
| SRV07 | 76.61                      | 280.544                        | .856                             | .911                         | .971                             |
| SRV08 | 76.80                      | 276.711                        | .847                             | .916                         | .971                             |
| SRV09 | 76.80                      | 275.461                        | .863                             | .930                         | .971                             |
| SRV10 | 76.83                      | 278.295                        | .758                             | .678                         | .972                             |
| SRV11 | 76.95                      | 274.248                        | .851                             | .901                         | .971                             |
| SRV12 | 76.98                      | 267.874                        | .861                             | .934                         | .971                             |
| SRV13 | 76.83                      | 281.295                        | .742                             | .820                         | .973                             |
| SRV14 | 77.05                      | 281.548                        | .700                             | .802                         | .973                             |
| SRV15 | 76.63                      | 277.838                        | .839                             | .860                         | .971                             |

**Table 3.37 Relationship Value - Study 2 (Buyer)**  
**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|----------------------------------------------|------------|
| .987             | .988                                         | 14         |

**Table 3.38 Relationship Value – Study 2 (Buyer)**  
**Item-Total Statistics**

|       | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|-------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| BRV01 | 70.50                      | 442.567                        | .823                             | .957                         | .988                             |
| BRV02 | 70.36                      | 441.547                        | .862                             | .952                         | .987                             |
| BRV03 | 70.29                      | 439.379                        | .938                             | .923                         | .986                             |
| BRV04 | 70.12                      | 443.060                        | .927                             | .922                         | .986                             |
| BRV05 | 70.34                      | 449.591                        | .902                             | .951                         | .987                             |
| BRV06 | 70.40                      | 447.946                        | .914                             | .964                         | .987                             |
| BRV07 | 70.81                      | 432.715                        | .940                             | .928                         | .986                             |
| BRV08 | 70.12                      | 438.560                        | .957                             | .952                         | .986                             |
| BRV09 | 70.43                      | 437.952                        | .926                             | .926                         | .986                             |
| BRV10 | 70.29                      | 432.094                        | .952                             | .955                         | .986                             |
| BRV11 | 70.40                      | 429.199                        | .973                             | .970                         | .986                             |
| BRV12 | 70.40                      | 433.984                        | .959                             | .965                         | .986                             |
| BRV13 | 70.67                      | 461.141                        | .811                             | .813                         | .988                             |
| BRV14 | 70.40                      | 434.803                        | .959                             | .965                         | .986                             |

from the final survey, and Chapter 5 draws conclusions from the research findings, and suggests directions for future research.

## **CHAPTER FOUR**

### **DATA ANALYSIS AND RESULTS**

This chapter explains the main survey data analyses and results of hypotheses testing. Sample descriptive statistics are presented including sample response rate, demographics, and descriptive statistics. The next section examines construct validity and reliability of the final sample data for each of the constructs in the proposed model. In the last section, results of statistical analyses, hypotheses testing, and the overall model are presented. Descriptive statistics were calculated using SPSS 12.0., and structural equation modeling analyses were conducted using AMOS 5.

#### **STATISTICAL ANALYSIS**

One of the objectives of this dissertation was to determine whether and how firms' perceptions of inter-firm knowledge sharing vary based on the channel position of the selected partner. Thus, it was *not* necessary to pool the data into a common model. Instead, data analyses were performed separately for the two groups of responses (buyers and sellers). This provided insight into whether relationships among constructs are consistent on both sides of the dyad. In testing the hypotheses, we centered the attention on examining the relative emphasis placed on each construct within each group.

Structural Equation Modeling (SEM) was used as the main statistical analysis tool to purify the measurement items and test the hypotheses developed in Chapter 2. It was considered an appropriate technique to evaluate the research hypotheses due to the covariate nature of the model (Loehlin 1988). There has been substantive use of SEM in

psychology and the social sciences (Anderson and Gerbing 1988). One reason for this is that these confirmatory methods (e.g., Bentler 1983; Browne 1984; Joreskog 1978) provide researchers with a comprehensive means for assessing and modifying theoretical models (Anderson and Gerbing 1988). SEM offers many advantages over other statistical techniques such as accounting for measurement error in latent variables when estimating path relationships between latent variables. In addition, SEM is ideal for comparing rival theoretical models (Garver and Mentzer 1999), and offers great potential for furthering theory development (Anderson and Gerbing 1988).

After the measurement model was validated in SEM, the researcher would estimate the structural model of SEM, which is the procedure for empirical estimation of the strength of each relationship (path) between independent and dependent variables depicted in the theory (Hair, Anderson, Tatham, and Black 1998). According to these researchers, the most obvious examination of the structural model involves the significance of estimated coefficients. Once the model is believed acceptable, the researcher will analyze the SEM analysis results against all the hypotheses and examine whether relationships among constructs are consistent on both sides of the dyad.

Specifically, the following goodness-of-fit indices were used to assess the adequacy of the overall fit between the data and the theoretical model, as well as the components of the model. The analysis was iterated for the two data sets from both the buyer and seller groups. Below is a description of the fit measures that are used along with their recommended threshold levels for acceptable fit.

- 1) The likelihood-ratio chi-square test is an absolute measure of fit that indicates the degree to which the model is consistent with the pattern of variances and

covariances from the observed data. It assesses non-significance of difference (i.e., the observed matrix is not significantly different from the estimated matrix). As such, low chi-square values indicate a good fit.

- 2) The chi-square ratio (CMIN/DF) is an absolute measure of fit that adjusts the chi-square statistics for the degrees of freedom in the model. Ratios in the range of two to five are generally considered an indication of acceptable fit (Hair et al. 1998).
- 3) The Bentler comparison-fit index (CFI) is an incremental fit statistic that allows the comparison of various models with the independent model where no relationship among variables is specified. The index ranges from 0 to 1. Values of 0.90 or greater indicate a good fit (Baumgartner and Homberg 1996).
- 4) The Tucker-Lewis index (TLI) is an incremental fit statistic that combines a measure of parsimony into a comparative index between the proposed model and null model. The recommended value for the TLI is 0.90 or greater.
- 5) The root mean square error of approximation (RMSEA) is a measure of absolute fit that compares the average difference per degree of freedom expected to occur in the population (not the sample), thus this index is thought to be relatively unaffected by sample size. Values within the range of 0.05 and 0.08 are acceptable (Baumgartner and Homberg 1996).

## **PSYCHOMETRIC CONCERNS**

To improve the quality of the statistical analysis, a detailed analysis of the specific psychometric issues was performed. This analysis was done to improve reliability and validity, and reduce bias and error. Poor measurement can invalidate any scientific investigation. Thus, all the measurements must be critically and empirically examined for their reliability and validity (Kerlinger and Lee 2000). When the survey development is driven by theoretical foundation, the primary approach for scale purification is to rely on confirmatory factor analysis (CFA) to ensure scale unidimensionality, followed by scale reliability and construct validity assessments (Gerbing and Anderson 1988).

### **Unidimensionality**

Unidimensionality is the characteristic of a set of indicators (manifest variables) that has only one underlying trait or concept in common (Hair, Anderson, Tatham, and Black 1998). Gerbing and Anderson (1988) argued that CFA affords a stricter interpretation of unidimensionality than can be provided by more traditional methods and yields different conclusions about the acceptability of a scale. For example, as pointed out by Hair, Anderson, Tatham, and Black (1998), Cronbach's alpha does not ensure unidimensionality but instead assumes it exists. Therefore, this study performed a CFA to test unidimensionality (cf. Bienstock, Mentzer, and Bird 1997; Mentzer, Flint, and Kent 1999).

### **Construct Validity**

Construct validity refers to the degree to which a construct corresponds to what its dimensions are intended to measure (Cronbach and Meehl 1955; Peter 1981). Thus, a

researcher must be certain that measures/items are convergent (correlate with the other items within the same construct), and are discriminant (do not correlate with items in another construct). The goal is to develop distinctive unidimensional scales. Construct validity was tested in the process while evaluating unidimensionality through CFA.

### **Internal Validity**

Peter (1979, 1981) relates internal validity to reliability of measures or the degree to which measures actually measure constructs. The four possible threats to internal validity as suggested by Isaac and Michaels (1997) are: history, maturation, instrumentation, and non-response. History biases are caused due to changes in the environment over the course of the study. As data collection in this study did not span longer than 2 months, history biases were not a concern. Maturation bias occurs when subjects are repeatedly exposed to measures and research questions. As this research was a one time study, maturation bias was not an issue.

Instrumentation bias has also been related to face and content validity in that multiple item constructs appear to be related to what they should measure (Narver and Slater 1990, Nunnally 1978). To reduce the impact of instrumentation bias, the method suggested by Churchill (1979) was employed and existing/tested scales were used, where possible.

Non-response error is defined as the variation between the true mean value of the variable in the original sample and the true mean value in the net sample (Malhotra 1993). Alreck and Settle (1995) argued that non-response can be a very serious problem when there is a direct connection between the purpose of the survey and the information

needs, on the one hand, and likelihood to respond, on the other. A test on the non-response error can be conducted by comparing early and late respondents for all of the constructs included in the study, using Analysis of Variance (ANOVA) as suggested by Armstrong and Overton (1977). However, comparing the values obtained from early and late respondents cannot guarantee the absence of non-response bias. As such, the researcher would adopt a suggestion by Mentzer and Flint (1997) and contact a random sample of thirty non-respondents either via telephone or fax or email. They would be asked five non-demographic questions that are related to the hypotheses of this study. Their responses would then be compared with those from respondents through ANOVA.

### **External Validity**

External validity is the degree to which research findings can be generalized to a population (Lynch, Calder, Phillips and Tybout 1982). Thus, external validity is important for research to make a significant contribution to the marketing and supply chain management literature. Although external validity cannot be established in a single study, to improve external validity, the survey was pre-tested, a single setting was not used, and subjects were not exposed to multiple treatments/items.

## **FINAL SAMPLE DATA**

### **The Firms**

The supply chain dyads examined in this study are manufacturing companies and their overseas suppliers. The sample frame was provided by the faculty members in charge of the Integrated Value Chain Forum and the Executives-in-Residence program at

the University of Tennessee. Altogether 18 manufacturing firms were contacted. A majority of the firms expressed interests and thought that the topic of the study was highly relevant to their industries and their current business situations. However, 2 firms were bound by legal agreement not to disclose any information about the identity of their suppliers and the business relationships. 1 firm did deal with a good number of overseas suppliers but they were highly concentrated in only one geographical region, thus not able to provide the study with diverse geographical differences to generate enough variance for the study. 3 firms mainly purchased through local importers and only dealt with overseas suppliers at a very minimal level. Several others cited timing issues as the reason for not being able to participate in this study. Finally, the global procurement/sourcing divisions of four manufacturing companies (2 U.S. based, and 2 European based companies with operations throughout the world) agreed to participate. The pre-screening process suggested that they were suitable participants for this research. Study Two's respondents are buyers from these four leading companies representing the following three different three industries: consumer durables (65%), industrial chemicals (25%) and industrial packaging products (10%). The four firms provided a participant list consisting of 115 vertical dyads – their procurement executives and the marketing/sales executives from their overseas supplier firms. The participants came from 19 countries, including the United States, Germany, Holland, Italy, Poland, China, Japan, Korea, Singapore, Malaysia, India, Taiwan, Mexico, Brazil, Chile, Argentina, Australia, South Africa, and Czech Republic.

The dyads had worked with each other 12.2 years on average and annually purchased over \$400 million in materials. This represented approximately 22% of the

buyers' total annual purchases in the category. Nearly 55% of the purchases typically made were a mixture of first-time, routine, and modified routine purchases. Over 50% of the relationships surveyed described them as being in the mature phase of their relationship life cycle. The respondents therefore have good knowledge about the relationship.

## **Implementation**

The web-based survey in this study was constructed following Dillman's principles (see Dillman 2000, p. 376-399). The weblink containing the survey questionnaire was embedded in the invitation emails sent directly to the respondents individually. The survey plan was launched and completed within a time frame of five weeks through a multiple-contact strategy.

## **Response Rate**

### ***Study One (Seller)***

Of the 115 surveys sent out in Study One, 107 were completed and returned. 2 of the returned surveys were not usable because each of the respondents missed more than 50% of the questions. The final number of usable responses was 105. The effective response rate was 91%.

### ***Study Two (Buyer)***

Of the 115 surveys sent out in Study Two, 105 were completed and returned. The effective response rate for Study Two was 91%.

### ***Dyadic Sample Data***

The final number of usable dyadic data was 105 pairs, providing us with an overall effective response rate of 91%.

### **Nonresponse Bias**

The 9% non response did not appear to be a major concern. Following the suggestions by Mentzer and Flint (1997), the researcher did try to contact several non-respondents and requested them to complete five substantive surveys items, and further conduct a test to determine if they were significantly different from those of the respondents. However, none of the contacts was successful. The non-respondents were either not available or not willing to participate. However, the high response rate indicated nonresponse bias was not a major concern.

### **Missing Data**

There was no significant missing data issue in the study. Two of the returned surveys in Study One had several pages of questions unanswered. They were eliminated from the pool of data before analysis was conducted.

### **Data Distribution Characteristics**

Data distribution characteristics for the Study One sample data, including means, standard deviations, skewness and kurtosis, are reported in Table 4.1. All 69 items in the main study were measured on 7-point Likert-type scales. The mean values ranged from 3.53 to 5.86 with standard deviations ranging from 0.97 and 1.79. These were considered acceptable levels of range and deviation and therefore all items were retained.

**Table 4.1 Study One (Seller) - Descriptive Statistics**

| <b>Item</b> | <b>Mean Statistics</b> | <b>Std. Dev Statistics</b> | <b>Skewness Statistics</b> | <b>Std. Error</b> | <b>Kurtosis Statistics</b> | <b>Std. Error</b> |
|-------------|------------------------|----------------------------|----------------------------|-------------------|----------------------------|-------------------|
| KS01        | 4.6952                 | 1.79810                    | -.482                      | .236              | -.655                      | .467              |
| KS02        | 4.5714                 | 1.52452                    | -0.221                     | .236              | -0.897                     | .467              |
| KS03        | 4.6286                 | 1.63058                    | -0.682                     | .236              | -0.189                     | .467              |
| KS04        | 4.7714                 | 1.54582                    | -0.436                     | .236              | -0.774                     | .467              |
| KS05        | 4.8857                 | 1.83090                    | -0.690                     | .236              | -0.582                     | .467              |
| KS06        | 4.7619                 | 1.48404                    | -0.804                     | .236              | 0.233                      | .467              |
| KS07        | 4.6286                 | 1.44287                    | -0.360                     | .236              | -0.734                     | .467              |
| KS08        | 4.0000                 | 1.35873                    | 0.328                      | .236              | -0.148                     | .467              |
| KS09        | 3.9143                 | 1.44857                    | 0.597                      | .236              | -0.209                     | .467              |
| KS10        | 4.0857                 | 1.34532                    | 0.445                      | .236              | -0.443                     | .467              |
| KS11        | 4.2095                 | 1.48515                    | 0.206                      | .236              | -0.836                     | .467              |
| KS12        | 3.6762                 | 1.19691                    | 0.173                      | .236              | -0.784                     | .467              |
| KS13        | 3.5333                 | 1.17724                    | -0.027                     | .236              | -0.727                     | .467              |
| KS14        | 3.6286                 | 1.30279                    | 0.616                      | .236              | 0.085                      | .467              |
| KS15        | 3.7524                 | 1.29185                    | -0.179                     | .236              | -0.526                     | .467              |
| KS16        | 3.8667                 | 1.41467                    | 0.178                      | .236              | -0.740                     | .467              |
| KS17        | 3.8762                 | 1.38464                    | 0.337                      | .236              | -0.495                     | .467              |
| EU01        | 4.3524                 | 1.26324                    | -0.491                     | .236              | -0.048                     | .467              |
| EU02        | 4.0952                 | 1.35536                    | 0.108                      | .236              | -0.543                     | .467              |
| EU03        | 4.1238                 | 1.26107                    | -0.003                     | .236              | 0.327                      | .467              |
| EU04        | 4.0190                 | 1.21672                    | -0.298                     | .236              | -0.235                     | .467              |
| EU05        | 4.3143                 | 1.19546                    | -0.358                     | .236              | 0.045                      | .467              |
| EF01        | 4.0190                 | 1.27838                    | -0.402                     | .236              | -0.540                     | .467              |
| EF02        | 3.8476                 | 1.22302                    | -0.410                     | .236              | -0.932                     | .467              |
| EF03        | 3.6571                 | 1.28474                    | -0.024                     | .236              | -0.866                     | .467              |
| EF04        | 3.6952                 | 1.24903                    | -0.094                     | .236              | -0.586                     | .467              |
| EF05        | 3.6762                 | 1.28224                    | -0.095                     | .236              | -0.651                     | .467              |
| EF06        | 3.7143                 | 1.32806                    | -0.085                     | .236              | -1.064                     | .467              |
| EF07        | 3.6476                 | 1.27083                    | -0.080                     | .236              | -0.954                     | .467              |
| CM01        | 4.1619                 | 1.26433                    | -0.049                     | .236              | 0.138                      | .467              |
| CM02        | 4.0667                 | 1.14578                    | 0.063                      | .236              | 0.734                      | .467              |
| CM03        | 4.0476                 | 1.33288                    | 0.110                      | .236              | -0.347                     | .467              |
| CP01        | 3.8000                 | 1.16355                    | -0.010                     | .236              | -1.078                     | .467              |
| CP02        | 3.7810                 | 1.14338                    | -0.030                     | .236              | -0.647                     | .467              |
| CP03        | 4.0000                 | 1.23257                    | 0.063                      | .236              | -0.696                     | .467              |
| ID01        | 3.9238                 | 1.14098                    | -0.086                     | .236              | -0.881                     | .467              |
| ID02        | 3.8762                 | 1.19047                    | -0.279                     | .236              | -1.001                     | .467              |
| ID03        | 3.8667                 | 1.18538                    | -0.125                     | .236              | -1.288                     | .467              |
| IV01        | 3.8952                 | 1.26281                    | -0.150                     | .236              | -0.592                     | .467              |

**Table 4.1 Continued**

| <b>Item</b> | <b>Mean<br/>Statistics</b> | <b>Std. Dev<br/>Statistics</b> | <b>Skewness<br/>Statistics</b> | <b>Std.<br/>Error</b> | <b>Kurtosis<br/>Statistics</b> | <b>Std.<br/>Error</b> |
|-------------|----------------------------|--------------------------------|--------------------------------|-----------------------|--------------------------------|-----------------------|
| IV02        | 3.7333                     | 1.14578                        | -0.044                         | .236                  | -0.996                         | .467                  |
| IV03        | 3.7905                     | 1.12400                        | -0.114                         | .236                  | -1.076                         | .467                  |
| TS01        | 4.4476                     | 1.03757                        | -0.200                         | .236                  | -0.566                         | .467                  |
| TS02        | 4.3905                     | 1.09628                        | -0.027                         | .236                  | -0.846                         | .467                  |
| TS03        | 4.3905                     | 1.01428                        | 0.051                          | .236                  | -0.642                         | .467                  |
| TS04        | 4.3810                     | 0.97449                        | 0.056                          | .236                  | -0.991                         | .467                  |
| TS05        | 4.4952                     | 1.00119                        | -0.309                         | .236                  | -1.051                         | .467                  |
| SRV01       | 5.5333                     | 1.23309                        | -0.549                         | .236                  | -0.597                         | .467                  |
| SRV02       | 5.4381                     | 1.17607                        | -0.228                         | .236                  | -1.039                         | .467                  |
| SRV03       | 5.3810                     | 1.03200                        | -0.396                         | .236                  | -0.511                         | .467                  |
| SRV04       | 4.2762                     | 1.35516                        | 0.333                          | .236                  | -0.643                         | .467                  |
| SRV05       | 4.2476                     | 1.36425                        | 0.303                          | .236                  | -0.505                         | .467                  |
| SRV06       | 4.3429                     | 1.47302                        | -0.154                         | .236                  | -0.357                         | .467                  |
| SRV07       | 4.6476                     | 1.37967                        | 0.235                          | .236                  | -0.675                         | .467                  |
| SRV08       | 4.4381                     | 1.36525                        | 0.179                          | .236                  | -0.410                         | .467                  |
| SRV09       | 4.4857                     | 1.33095                        | -0.256                         | .236                  | -0.239                         | .467                  |
| SRV10       | 4.4381                     | 1.20035                        | -0.565                         | .236                  | -0.260                         | .467                  |
| SRV11       | 4.5048                     | 1.28694                        | -0.549                         | .236                  | -0.631                         | .467                  |
| SRV12       | 4.4857                     | 1.29432                        | -0.592                         | .236                  | -0.704                         | .467                  |
| SRV13       | 5.7333                     | 1.29546                        | -1.219                         | .236                  | 1.203                          | .467                  |
| SRV14       | 5.6667                     | 1.25320                        | -1.254                         | .236                  | 1.442                          | .467                  |
| SRV15       | 5.8667                     | 1.39413                        | -1.168                         | .236                  | 0.660                          | .467                  |
| SP01        | 5.5524                     | 1.35150                        | -0.470                         | .236                  | -0.944                         | .467                  |
| SP02        | 5.3143                     | 1.50840                        | -0.432                         | .236                  | -1.018                         | .467                  |
| SP03        | 5.4857                     | 1.34532                        | -0.464                         | .236                  | -0.860                         | .467                  |
| SP04        | 5.2667                     | 1.51446                        | -0.431                         | .236                  | -1.054                         | .467                  |
| SP05        | 5.5238                     | 1.37348                        | -0.493                         | .236                  | -0.789                         | .467                  |
| SP06        | 5.3524                     | 1.51265                        | -0.519                         | .236                  | -0.858                         | .467                  |
| SP07        | 5.5238                     | 1.33802                        | -0.494                         | .236                  | -0.847                         | .467                  |
| SP08        | 5.2952                     | 1.49951                        | -0.468                         | .236                  | -0.989                         | .467                  |

Further analysis of data for non-normal distribution of items was conducted using statistical tests for skewness and kurtosis. It appeared that all items did not have a serious level of skewness and kurtosis. Thus, all items were retained at this point.

Data distribution characteristics for the Study Two sample data, including means, standard deviations, skewness and kurtosis, are reported in Table 4.2. All 68 items in the main study were measured on 7-point Likert-type scales. The mean values ranged from 3.552 to 5.66 with standard deviations ranging from 0.974 and 1.755. These were considered acceptable levels of range and deviation and therefore all items were retained. Further analysis of data for non-normal distribution of items was conducted using statistical tests for skewness and kurtosis. It appeared that all items had an acceptable level of skewness and kurtosis. Thus, all items were retained at this point.

The data also went through a trial run using Bollen-Stine bootstrap in the scale confirmation step to ensure data normality. The fit statistics between the actual sample set and the bootstrapped sample set did not produce any significantly different outcome. Thus, the final scale confirmation analysis was conducted using the actual sample set.

## **SCALE CONFIRMATION**

The measures and scales were analyzed in both SPSS and AMOS. Various components of the SEM output - standardized regression weights, squared multiple correlations, modification indices, and goodness-of-fit indicators - were used to confirm the scales through their unidimensionality, reliability, and construct validity.

Following Anderson and Gerbing's (1988) two-step approach to structural equation modeling, confirmatory assessment of construct validity for the measurement

**Table 4.2 Study Two (Buyer) - Descriptive Statistics**

| Item | Mean Statistics | Std. Dev Statistics | Skewness Statistics | Std. Error | Kurtosis Statistics | Std. Error |
|------|-----------------|---------------------|---------------------|------------|---------------------|------------|
| KS01 | 4.7333          | 1.75558             | -.485               | .236       | -.578               | .467       |
| KS02 | 4.5810          | 1.53034             | -.230               | .236       | -.917               | .467       |
| KS03 | 4.6476          | 1.64071             | -.693               | .236       | -.218               | .467       |
| KS04 | 4.7619          | 1.54125             | -.426               | .236       | -.761               | .467       |
| KS05 | 4.8857          | 1.80977             | -.719               | .236       | -.494               | .467       |
| KS06 | 4.7619          | 1.48404             | -.804               | .236       | .233                | .467       |
| KS07 | 4.6190          | 1.44369             | -.340               | .236       | -.749               | .467       |
| KS08 | 4.0095          | 1.35516             | .313                | .236       | -.129               | .467       |
| KS09 | 3.9333          | 1.40922             | .520                | .236       | -.141               | .467       |
| KS10 | 4.0857          | 1.34532             | .445                | .236       | -.443               | .467       |
| KS11 | 4.2095          | 1.48515             | .206                | .236       | -.836               | .467       |
| KS12 | 3.6762          | 1.19691             | .173                | .236       | -.784               | .467       |
| KS13 | 3.5524          | 1.16834             | .019                | .236       | -.827               | .467       |
| KS14 | 3.6381          | 1.29439             | .624                | .236       | .124                | .467       |
| KS15 | 3.7524          | 1.29185             | -.179               | .236       | -.526               | .467       |
| KS16 | 3.8667          | 1.41467             | .178                | .236       | -.740               | .467       |
| KS17 | 3.8762          | 1.38464             | .337                | .236       | -.495               | .467       |
| EU01 | 4.3524          | 1.26324             | -.491               | .236       | -.048               | .467       |
| EU02 | 4.0952          | 1.35536             | .108                | .236       | -.543               | .467       |
| EU03 | 4.1238          | 1.26107             | -.003               | .236       | .327                | .467       |
| EU04 | 4.0190          | 1.21672             | -.298               | .236       | -.235               | .467       |
| EU05 | 4.3143          | 1.19546             | -.358               | .236       | .045                | .467       |
| EF01 | 4.0190          | 1.27838             | -.402               | .236       | -.540               | .467       |
| EF02 | 3.8476          | 1.22302             | -.410               | .236       | -.932               | .467       |
| EF03 | 3.6762          | 1.26715             | -.001               | .236       | -.910               | .467       |
| EF04 | 3.6952          | 1.24903             | -.094               | .236       | -.586               | .467       |
| EF05 | 3.6762          | 1.28224             | -.095               | .236       | -.651               | .467       |
| EF06 | 3.7143          | 1.32806             | -.085               | .236       | -1.064              | .467       |
| EF07 | 3.6476          | 1.27083             | -.080               | .236       | -.954               | .467       |
| CM01 | 4.1619          | 1.27945             | -.085               | .236       | .066                | .467       |
| CM02 | 4.0667          | 1.14578             | .063                | .236       | .734                | .467       |
| CM03 | 4.0476          | 1.33288             | .110                | .236       | -.347               | .467       |
| CP01 | 3.8000          | 1.16355             | -.010               | .236       | -1.078              | .467       |
| CP02 | 3.7810          | 1.14338             | -.030               | .236       | -.647               | .467       |
| CP03 | 4.0000          | 1.23257             | .063                | .236       | -.696               | .467       |
| ID01 | 3.8857          | 1.17926             | -.097               | .236       | -.965               | .467       |
| ID02 | 3.8857          | 1.17926             | -.276               | .236       | -.974               | .467       |
| ID03 | 3.8667          | 1.18538             | -.125               | .236       | -1.288              | .467       |

**Table 4.2 Continued**

| Item  | Mean Statistics | Std. Dev Statistics | Skewness Statistics | Std. Error | Kurtosis Statistics | Std. Error |
|-------|-----------------|---------------------|---------------------|------------|---------------------|------------|
| IV01  | 3.8952          | 1.26281             | -.150               | .236       | -.592               | .467       |
| IV02  | 3.7333          | 1.14578             | -.044               | .236       | -.996               | .467       |
| IV03  | 3.7905          | 1.12400             | -.114               | .236       | -1.076              | .467       |
| TS01  | 4.4476          | 1.03757             | -.200               | .236       | -.566               | .467       |
| TS02  | 4.3905          | 1.09628             | -.027               | .236       | -.846               | .467       |
| TS03  | 4.3905          | 1.01428             | .051                | .236       | -.642               | .467       |
| TS04  | 4.3810          | .97449              | .056                | .236       | -.991               | .467       |
| TS05  | 4.4952          | 1.00119             | -.309               | .236       | -1.051              | .467       |
| BRV01 | 5.5143          | 1.23346             | -.535               | .236       | -.632               | .467       |
| BRV02 | 5.4190          | 1.18306             | -.194               | .236       | -1.080              | .467       |
| BRV03 | 5.3619          | 1.08419             | -.352               | .236       | -.639               | .467       |
| BRV04 | 5.4286          | 1.19178             | -.470               | .236       | -.686               | .467       |
| BRV05 | 4.3143          | 1.39583             | .175                | .236       | -.720               | .467       |
| BRV06 | 4.4286          | 1.40642             | .001                | .236       | -.791               | .467       |
| BRV07 | 4.4476          | 1.40727             | .046                | .236       | -.720               | .467       |
| BRV08 | 4.4571          | 1.33754             | .241                | .236       | -.394               | .467       |
| BRV09 | 4.5333          | 1.28652             | -.117               | .236       | -.181               | .467       |
| BRV10 | 4.6381          | 1.26433             | -.129               | .236       | -.325               | .467       |
| BRV11 | 4.5048          | 1.28694             | -.549               | .236       | -.631               | .467       |
| BRV12 | 4.4857          | 1.29432             | -.592               | .236       | -.704               | .467       |
| BRV13 | 5.3333          | 1.29842             | -.619               | .236       | .012                | .467       |
| BRV14 | 5.6667          | 1.25320             | -1.254              | .236       | 1.442               | .467       |
| SP01  | 5.5524          | 1.35150             | -.470               | .236       | -.944               | .467       |
| SP02  | 5.3143          | 1.50840             | -.432               | .236       | -1.018              | .467       |
| SP03  | 5.4857          | 1.34532             | -.464               | .236       | -.860               | .467       |
| SP04  | 5.2667          | 1.51446             | -.431               | .236       | -1.054              | .467       |
| SP05  | 5.5238          | 1.37348             | -.493               | .236       | -.789               | .467       |
| SP06  | 5.3524          | 1.51265             | -.519               | .236       | -.858               | .467       |
| SP07  | 5.5238          | 1.33802             | -.494               | .236       | -.847               | .467       |
| SP08  | 5.2952          | 1.49951             | -.468               | .236       | -.989               | .467       |

model was conducted prior to confirmatory assessment of the structural model's nomological validity. The measurement model delineates relationships between observed indicator variables and the unobserved constructs they were designed to measure, thus specifying the pattern by which each measure loads on a particular factor. Confirmatory factor analysis (CFA) of the measurement model is considered appropriate when there is theoretical and empirical knowledge of the underlying latent variable structure (Anderson and Gerbing 1988, Byrne 2001). Each observed measure was assigned to only one latent variable and all latent variables were allowed to correlate freely.

Due to the sample size  $N = 105$  and the complexity of the model (2 established second order constructs; and 69 items in total for Study 1, 68 items for Study 2), the proposed model was partitioned into three parts while conducting the confirmatory factor analysis – the first model consisted of all the 6 antecedents, while the other two models consisted of the focal construct (Inter-firm Knowledge Sharing) and the outcome variable (Relationship Value) respectively. It was decided that Perceived Supply Chain Performance be removed from the model, so as to cut down the total number of items for testing and render the model stronger stability for SEM. Thus, Hypothesis H9 (Inter-Firm Knowledge Sharing has a positive effect on perceived supply chain performance) was not tested in the study.

The maximum likelihood estimation was used as it is the most common estimation procedure for theory-based models (Anderson and Gerbing 1988; Hair et al. 1998). Various components of the SEM output – standardized regression weight, squared multiple correlations, modification indices, and multiple goodness of fit indicators – were

used to confirm the scales through their unidimensionality, reliability and construct validity.

Assessing a model's fit is one of SEM's most controversial aspects (see Shook, Ketchen, Hult and Kacmar 2004). Before assessing individual parameters, one must assess the overall fit of the observed data to an *a priori* model (Joreskog et al., 1999). Many of the heuristics on the fit statistics may or may not be appropriate for a specific data set (Brannick 1995). Thus, until a definitive measure is developed, researchers should use multiple measures to provide evidence about their models (Breckler 1990). For example, when RMSEA is at the range between 0.80 and 0.10, it could be considered as mediocre fit. However, researchers cautioned that when sample size is small, the RMSEA tend to over-reject true population models (Hu and Bentler 1999). These criteria are based solely on subjective judgment, and cannot be regarded as infallible and correct (Byrne, 2001). As such, throughout the whole process of data analysis, qualitative assessments and literature review continued to play an important role in the interpretation of the statistics in scale confirmation.

The initial step in examining results of the measurement is to determine the presence of offending estimates, that is, those that exceed acceptable limits by having negative variances or standardized regression weights that exceed 1.00 (Hair et al. 1998). All items were examined and found to be satisfactory.

### **Unidimensionality**

Unidimensionality is demonstrated through the overall goodness of fit of the model, the convergence of items on the latent variables they purport to measure and the

discriminance of items on latent variables they are not intended to measure (Anderson and Gerbing 1982; Gerbing and Anderson 1988). For the initial Antecedent Model, the fit of the measurement model, which is the highest possible fit the model can achieve, is acceptable (see Table 4.3).

### **Convergent Validity**

To assess convergent validity, the statistical significance, direction, and magnitude of the estimated standardized regression weights and squared multiple correlations between the items and their latent variables were evaluated (Table 4.4 and 4.5). Each latent variable-to-item equation in SEM assesses the reliability of the individual item as a measure of the latent variable (Garver and Mentzer 1999). The squared multiple correlation value is the measure of the strength of the linear relationship between the latent variable and the item; that is, the latent variable is considered to cause variation in the item. The higher the correlation, the stronger the systematic component of variance associated with the item, offering strong support for the assumption of unidimensionality. All item loadings were found to be significant in both Study One and Study Two.

**Table 4.3 Initial Measurement Model Goodness-of-Fit  
The Antecedent Model**

| <b>Fit Measure</b> | <b>Study One - Seller</b> | <b>Study Two - Buyer</b> |
|--------------------|---------------------------|--------------------------|
| Chi-Square         | 622.07                    | 612.626                  |
| Degree of freedom  | 356                       | 356                      |
| CMIN/DF            | 1.747                     | 1.721                    |
| CFI                | 0.943                     | 0.936                    |
| TLI                | 0.924                     | 0.927                    |
| RMSEA              | 0.085                     | 0.083                    |

**Table 4.4 Study One (Seller) – The Antecedent Variables  
Standardized Regressions and Squared Multiple Correlations**

| <b>Item</b> |   | <b>Construct</b>          | <b>Standardized Regression</b> | <b>Squared Multiple Correlations</b> |
|-------------|---|---------------------------|--------------------------------|--------------------------------------|
| EU01        | ← | Environmental Uncertainty | 0.941                          | 0.886                                |
| EU02        | ← | Environmental Uncertainty | 0.915                          | 0.836                                |
| EU03        | ← | Environmental Uncertainty | 0.904                          | 0.817                                |
| EU04        | ← | Environmental Uncertainty | 0.972                          | 0.945                                |
| EU05        | ← | Environmental Uncertainty | 0.924                          | 0.854                                |
| EF01        | ← | Environmental Fit         | 0.853                          | 0.728                                |
| EF02        | ← | Environmental Fit         | 0.889                          | 0.791                                |
| EF03        | ← | Environmental Fit         | 0.934                          | 0.872                                |
| EF04        | ← | Environmental Fit         | 0.946                          | 0.896                                |
| EF05        | ← | Environmental Fit         | 0.953                          | 0.908                                |
| EF06        | ← | Environmental Fit         | 0.955                          | 0.911                                |
| EF07        | ← | Environmental Fit         | 0.948                          | 0.899                                |
| CM01        | ← | Complementarity           | 0.880                          | 0.775                                |
| CM02        | ← | Complementarity           | 0.957                          | 0.917                                |
| CM03        | ← | Complementarity           | 0.910                          | 0.829                                |
| CP01        | ← | Compatibility             | 0.798                          | 0.636                                |
| CP02        | ← | Compatibility             | 0.968                          | 0.936                                |
| CP03        | ← | Compatibility             | 0.933                          | 0.871                                |
| ID01        | ← | Interdependence           | 0.846                          | 0.717                                |
| ID02        | ← | Interdependence           | 0.928                          | 0.862                                |
| ID03        | ← | Interdependence           | 0.894                          | 0.799                                |
| IV01        | ← | Idiosyncratic Investments | 0.879                          | 0.773                                |
| IV02        | ← | Idiosyncratic Investments | 0.940                          | 0.885                                |
| IV03        | ← | Idiosyncratic Investments | 0.857                          | 0.734                                |
| TS01        | ← | Trust                     | 0.716                          | 0.513                                |
| TS02        | ← | Trust                     | 0.759                          | 0.576                                |
| TS03        | ← | Trust                     | 0.924                          | 0.853                                |
| TS04        | ← | Trust                     | 0.928                          | 0.861                                |
| TS05        | ← | Trust                     | 0.908                          | 0.825                                |

**Table 4.5 Study Two (Buyer) – The Antecedent Variables  
Standardized Regressions and Squared Multiple Correlations**

| <b>Item</b> |   | <b>Construct</b>          | <b>Standardized Regression</b> | <b>Squared Multiple Correlations</b> |
|-------------|---|---------------------------|--------------------------------|--------------------------------------|
| EU01        | ← | Environmental Uncertainty | 0.941                          | 0.886                                |
| EU02        | ← | Environmental Uncertainty | 0.914                          | 0.836                                |
| EU03        | ← | Environmental Uncertainty | 0.904                          | 0.817                                |
| EU04        | ← | Environmental Uncertainty | 0.972                          | 0.945                                |
| EU05        | ← | Environmental Uncertainty | 0.924                          | 0.854                                |
| EF01        | ← | Environmental Fit         | 0.854                          | 0.729                                |
| EF02        | ← | Environmental Fit         | 0.889                          | 0.790                                |
| EF03        | ← | Environmental Fit         | 0.929                          | 0.863                                |
| EF04        | ← | Environmental Fit         | 0.945                          | 0.893                                |
| EF05        | ← | Environmental Fit         | 0.952                          | 0.907                                |
| EF06        | ← | Environmental Fit         | 0.956                          | 0.913                                |
| EF07        | ← | Environmental Fit         | 0.949                          | 0.901                                |
| CM01        | ← | Complementarity           | 0.882                          | 0.777                                |
| CM02        | ← | Complementarity           | 0.952                          | 0.907                                |
| CM03        | ← | Complementarity           | 0.915                          | 0.837                                |
| CP01        | ← | Compatibility             | 0.798                          | 0.636                                |
| CP02        | ← | Compatibility             | 0.969                          | 0.938                                |
| CP03        | ← | Compatibility             | 0.932                          | 0.869                                |
| ID01        | ← | Interdependence           | 0.846                          | 0.716                                |
| ID02        | ← | Interdependence           | 0.928                          | 0.861                                |
| ID03        | ← | Interdependence           | 0.898                          | 0.806                                |
| IV01        | ← | Idiosyncratic Investments | 0.880                          | 0.775                                |
| IV02        | ← | Idiosyncratic Investments | 0.940                          | 0.883                                |
| IV03        | ← | Idiosyncratic Investments | 0.856                          | 0.733                                |
| TS01        | ← | Trust                     | 0.716                          | 0.513                                |
| TS02        | ← | Trust                     | 0.759                          | 0.576                                |
| TS03        | ← | Trust                     | 0.924                          | 0.854                                |
| TS04        | ← | Trust                     | 0.927                          | 0.860                                |
| TS05        | ← | Trust                     | 0.908                          | 0.824                                |

## **Discriminant Validity**

Modification Indices (MI) calculate unestimated relationships within a specified model to discern if specification of the (unspecified) relationship would render an improvement in overall model fit. In other words, the modification index points to items that want to load on a construct for which they were not intended to measure. Thus, MI values are used to assess discriminant validity. The MIs for regression weight were analyzed first and are listed in Table 4.7, followed by analysis of the covariances (Table 4.6). Large MIs indicate the presence of factor cross-loadings or error variances. The estimated parameter change (par change) indicates the degree to which the parameter would change from its current, constrained value if the constraints on it were removed.

A review of the MIs for covariances for Study One revealed two moderately large values (above 10) that needed consideration. EU02 and EU03 addressed perception of the stability of overall industry sales volume, and the accuracy of sales forecasts. They appeared to have systematic influence that justifies correlating the error terms. Because this is a within-factor correlation, the theoretical integrity of the correlation matrix remained intact. The same treatment was applied on EF04 (relating to predictability of the inflation rate in the country location of the firm's facilities) and EF05 (predictability of the inflation rate).

In Study Two, same treatment was deemed necessary for EU02 and EU03, as well as EF04 and EF05, according to the modification indices for covariances (Table 4.8).

A review of the MIs for regression weights for Both Study One and Study Two did not indicate any factor cross-loading problem. With the minor corrections suggested

**Table 4.6 Study One (Seller) - M.I. for Covariances**

|               | <b>M.I.</b> | <b>Par Change</b> |
|---------------|-------------|-------------------|
| eEF06 ↔ eEF07 | 13.144      | 0.069             |
| eEF04 ↔ eEF05 | 19.923      | 0.078             |
| eEU03 ↔ eEU02 | 20.144      | 0.146             |
| eEF01 ↔ eEF05 | 11.252      | - 0.095           |
| eEF02 ↔ eEF01 | 11.666      | 0.133             |
| eTS02 ↔ eEU03 | 11.418      | - 0.138           |
| eCP03 ↔ eEU02 | 13.144      | - 0.108           |
| eCP03 ↔ eEU05 | 13.603      | .090              |

**Table 4.7 Study One (Seller) - M.I. for Regression Weights**

|             | <b>M.I.</b> | <b>Par Change</b> |
|-------------|-------------|-------------------|
| EU03 ← TS02 | 14.681      | -0.196            |

**Table 4.8 Study Two (Buyer) - M.I. for Covariances**

|               | <b>M.I.</b> | <b>Par Change</b> |
|---------------|-------------|-------------------|
| eEF06 ↔ eEF07 | 12.216      | 0.066             |
| eEF04 ↔ eEF05 | 20.998      | 0.081             |
| eEU03 ↔ eEU02 | 20.135      | 0.145             |
| eEF01 ↔ eEF05 | 11.159      | - 0.095           |
| eEF02 ↔ eEF01 | 11.636      | 0.132             |
| eTS02 ↔ eEU03 | 11.444      | - 0.139           |
| eCP03 ↔ eEU02 | 13.040      | - 0.107           |
| eCP03 ↔ eEU05 | 13.577      | .090              |

under MIs for covariances, the measurement model goodness of fit was further improved (see Table 4.9 for the final measurement model for the antecedents).

### **The Inter-Firm Knowledge Sharing Scale (IFKS)**

#### ***Study One (Seller)***

This scale was borrowed directly from Selnes and Sallies (2003). It is a second-order construct with three dimensions: exchange of information, joint sense-making, and knowledge integration. Selnes and Sallies (2003) developed the 17-item scale through a set of qualitative interviews with managers in a context similar to this dissertation. The second order construct nature has been established with a composite reliability of 0.80, and a shared variance reliability of 0.67.

In this study, we further examined the fit statistics of the scale by first looking at the first-order analysis. In Study One, the fit statistics were poor (CMIN/df = 13.609, RMSEA = 0.348, CFI = 0.440, TLI = 0.366). The 17-items were then re-specified as a second order scale consisting of three factors: exchange of information (7 items KS01 to KS07), joint sense-making (4 items KS08 to KS11), and knowledge integration (6 items KS12 to KS17). The initial fit statistics were as follows: CMIN/df = 4.763, RMSEA = 0.19, CFI = 0.834, TLI = 0.811).

All 17 items' squared multiple correlations were above 0.2, and all yielded a minimum lambda weight of above 0.80 (see Table 4.10). The modification indices suggested the removal of several items due to cross loadings: KS06 (both parties exchange information on changes related to the two organizations' strategies and

**Table 4.9 Final Measurement Model Goodness-of-Fit  
The Antecedent Model**

| <b>Fit Measure</b> | <b>Study One - Seller</b> | <b>Study Two - Buyer</b> |
|--------------------|---------------------------|--------------------------|
| Chi-Square         | 576.59                    | 565.96                   |
| Degree of freedom  | 354                       | 354                      |
| CMIN/DF            | 1.629                     | 1.59                     |
| CFI                | 0.944                     | 0.947                    |
| TLI                | 0.936                     | 0.939                    |
| GFI                | 0.746                     | 0.749                    |
| RMSEA              | 0.078                     | 0.076                    |

**Table 4.10 Study One (Seller)  
Construct: Inter-firm Knowledge Sharing  
Standardized Regressions and Squared Multiple Correlations**

| <b>Item</b> |   | <b>Construct/Factor</b> | <b>Standardized Regression</b> | <b>Squared Multiple Correlations</b> |
|-------------|---|-------------------------|--------------------------------|--------------------------------------|
| KS01        | ← | Exchange of Information | 0.936                          | 0.877                                |
| KS02        | ← | Exchange of Information | 0.944                          | 0.891                                |
| KS03        | ← | Exchange of Information | 0.924                          | 0.854                                |
| KS04        | ← | Exchange of Information | 0.911                          | 0.829                                |
| KS05        | ← | Exchange of Information | 0.949                          | 0.900                                |
| KS06        | ← | Exchange of Information | 0.920                          | 0.847                                |
| KS07        | ← | Exchange of Information | 0.918                          | 0.843                                |
| KS08        | ← | Joint Sense-Making      | 0.896                          | 0.802                                |
| KS09        | ← | Joint Sense-Making      | 0.912                          | 0.832                                |
| KS10        | ← | Joint Sense-Making      | 0.963                          | 0.927                                |
| KS11        | ← | Joint Sense-Making      | 0.935                          | 0.875                                |
| KS12        | ← | Knowledge Integration   | 0.902                          | 0.813                                |
| KS13        | ← | Knowledge Integration   | 0.924                          | 0.853                                |
| KS14        | ← | Knowledge Integration   | 0.916                          | 0.839                                |
| KS15        | ← | Knowledge Integration   | 0.864                          | 0.747                                |
| KS16        | ← | Knowledge Integration   | 0.907                          | 0.823                                |
| KS17        | ← | Knowledge Integration   | 0.878                          | 0.770                                |

policies), KS10 (the atmosphere in the relationship stimulates productive discussion encompassing a variety of opinions), and KS13 (both parties frequently adjust their common understanding of end-user needs, preferences, and behavior). However, upon qualitative review of these items, it was concluded that these items were necessary to reflect each of the three dimensions of IFKS.

In this analysis, following Lusch and Brown (1996), the multi-dimensional nature of IFKS was measured by composite scores reflective of the three dimensions. It was concluded that the three sub-dimensional scale adequately fit the data in spite of the nonsignificant chi-square test, because almost all the goodness-of-fit measures exceeded 0.90 and the chi-square test may be unreliable due to sample size (Bagozzi and Yi 1988).

#### ***Study Two (Buyer)***

The procedures and rationale used in scale confirmation for IFKS in Study One were also applied to Study Two. Table 4.11 presents the standardized regressions and squared multiple correlations for the variable IFKS in Study Two.

In comparison (see Table 4.12 and 4.13), it was noted that the composite scale model produced the more preferred fit statistics. Furthermore, this specification also allowed all the 17-items to be retained to preserve the multi-dimensional characteristics of the scale.

During the hypothesis testing, Selnes and Sallies (2003) aggregated the IFKS scales by summing the measurement items to form the score for IFKS. This approach followed the arguments provided by Matsuno and Mentzer (2000). Aggregation was considered valid as (1) the second order IFKS scale has been established, (2) aggregation

**Table 4.11 Study Two (Buyer)**  
**Construct: Inter-firm Knowledge Sharing**  
**Standardized Regressions and Squared Multiple Correlations**

| Item |   | Construct/Factor        | Standardized Regression | Squared Multiple Correlations |
|------|---|-------------------------|-------------------------|-------------------------------|
| KS01 | ← | Exchange of Information | 0.940                   | 0.883                         |
| KS02 | ← | Exchange of Information | 0.946                   | 0.985                         |
| KS03 | ← | Exchange of Information | 0.933                   | 0.871                         |
| KS04 | ← | Exchange of Information | 0.916                   | 0.839                         |
| KS05 | ← | Exchange of Information | 0.953                   | 0.908                         |
| KS06 | ← | Exchange of Information | 0.922                   | 0.851                         |
| KS07 | ← | Exchange of Information | 0.922                   | 0.851                         |
| KS08 | ← | Joint Sense-Making      | 0.895                   | 0.800                         |
| KS09 | ← | Joint Sense-Making      | 0.918                   | 0.843                         |
| KS10 | ← | Joint Sense-Making      | 0.965                   | 0.932                         |
| KS11 | ← | Joint Sense-Making      | 0.933                   | 0.871                         |
| KS12 | ← | Knowledge Integration   | 0.901                   | 0.813                         |
| KS13 | ← | Knowledge Integration   | 0.934                   | 0.873                         |
| KS14 | ← | Knowledge Integration   | 0.917                   | 0.841                         |
| KS15 | ← | Knowledge Integration   | 0.867                   | 0.752                         |
| KS16 | ← | Knowledge Integration   | 0.904                   | 0.818                         |
| KS17 | ← | Knowledge Integration   | 0.876                   | 0.768                         |

**Table 4.12 Study One (Seller) - Comparison of Fit Statistics**  
**Construct: Inter-firm Knowledge Sharing**

| Fit Measure       | First Order | Second Order | Composite Scale |
|-------------------|-------------|--------------|-----------------|
| Chi-Square        | 1633.038    | 566.756      | 4.7             |
| Degree of freedom | 120         | 119          | 1               |
| CMIN/DF           | 13.609      | 4.76         | 4.7             |
| CFI               | 0.440       | 0.834        | 0.920           |
| TLI               | 0.366       | 0.811        | 0.760           |
| GFI               | 0.345       | 0.658        | 0.970           |
| RMSEA             | 0.348       | 0.190        | 0.189           |

**Table 4.13 Study Two (Buyer) - Comparison of Fit Statistics**  
**Construct: Inter-firm Knowledge Sharing**

| <b>Fit Measure</b> | <b>First Order</b> | <b>Second Order</b> | <b>Composite Scale</b> |
|--------------------|--------------------|---------------------|------------------------|
| Chi-Square         | 1542.502           | 496.842             | 4.54                   |
| Degree of freedom  | 120                | 119                 | 1                      |
| CMIN/DF            | 12.854             | 4.175               | 4.54                   |
| CFI                | 0.471              | 0.895               | 0.925                  |
| TLI                | 0.400              | 0.839               | 0.78                   |
| GFI                | 0.332              | 0.679               | 0.971                  |
| RMSEA              | 0.338              | 0.175               | 0.185                  |

enables maximization of the degrees of freedom in estimating path coefficients, and (3) aggregation reduces higher levels of random error while also accounting for measurement error and retaining the three-dimensional scale of inter-firm knowledge sharing. This study followed the same approach.

### **The Relationship Value Scale (SRV)**

#### ***Study One - Sellers' Perspective***

As this is a newly developed scale for the study, an exploratory factor analysis was conducted in SPSS. Using principal component analysis with Varimax rotation, the results show 6 distinct factors (all above 0.80), with an accumulative variance explained at 94.6%. (See Table 4.14). These numbers suggested that the 15-item Relationship Value scale could be a multiple-factor construct. This needed to be explored in the SEM confirmatory factor analysis.

SRV15 is a global scale asking respondent's degree of agreement on whether "their investments of resources in the relationship, such as, time, effort and money, have paid off very well." In the exploratory factor analysis, this turned out to be a single-item scale not loaded with any other items.

**Table 4.14 Study One (Seller) - Exploratory Factor Analysis  
Construct: Relationship Value**

| <b>Rotated Component Matrix</b> |             |             |             |             |             |             |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                                 | Component   |             |             |             |             |             |
|                                 | 1           | 2           | 3           | 4           | 5           | 6           |
| SRV01                           | <b>.866</b> | .213        | .204        | .131        | .280        | .114        |
| SRV02                           | <b>.914</b> | .217        | .193        | .083        | .191        | .067        |
| SRV03                           | <b>.872</b> | .224        | .251        | .155        | .125        | .114        |
| SRV04                           | <b>.909</b> | .212        | .247        | .145        | .123        | .104        |
| SRV05                           | .213        | <b>.937</b> | .182        | .119        | .076        | .061        |
| SRV06                           | .222        | <b>.944</b> | .191        | .075        | .010        | .088        |
| SRV07                           | .241        | <b>.926</b> | .171        | .096        | .060        | .101        |
| SRV08                           | .221        | .187        | <b>.886</b> | .107        | .272        | .074        |
| SRV09                           | .250        | .183        | <b>.931</b> | .082        | .068        | .036        |
| SRV10                           | .259        | .202        | <b>.903</b> | .113        | .142        | .029        |
| SRV11                           | .161        | .128        | .086        | <b>.949</b> | .178        | .063        |
| SRV12                           | .151        | .101        | .137        | <b>.961</b> | .088        | .061        |
| SRV13                           | .252        | .039        | .251        | .178        | <b>.885</b> | .164        |
| SRV14                           | .233        | .064        | .145        | .120        | <b>.927</b> | .133        |
| SRV15                           | .234        | .195        | .081        | .117        | .275        | <b>.901</b> |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 6 iterations.

The 15-item scale first went through a CFA first-order examination. As expected, the fit statistics were poor (CMIN/df = 19.247, CFI = 0.378, TLI = 0.282, RMSEA = 0.4193).

The 15-item scale was then re-specified as a second order construct with 5 dimensions (Product Quality 4 items, Communication 3 items, Delivery 3 items, Market Access 2 items, Pricing 2 items). In the second order model, SRV15 (single item) had to be excluded. The fit statistics were greatly improved as compared to the first-order model. However, it was discovered that the standardized regression weights for three items were exactly at the value of 1, i.e. SRV08, SRV10, and SRV13 loaded perfectly on the communication factor, market access factor and pricing factor respectively. This

result was not possible and caused problems with the model fit. Nonetheless, upon careful qualitative assessment, it was concluded that the removal of these three items would impact the content validity of the relationship value scale. Thus, it was decided that a composite scale be used to preserve all 6 dimensions of the scale. The composite scale produced adequate fit statistics: CMIN/df = 1.94, CFI = 0.944, TLI = 0.907, GFI = 0.952, RMSEA = 0.095) and was thus adopted in the final measurement model. Please refer to Table 4.15 for the standardized regressions and squared multiple, and Table 4.16 for the fit statistics comparison of the three different ways of model specification for the Relationship Value SRV scale (Study One - Seller).

### **The Relationship Value Scale (BRV)**

#### ***Study Two - Buyers' Perspective***

Following the same procedure in Study One, an exploratory factor analysis was conducted for the Relationship Value scale in Study Two. Using principal component analysis with Varimax rotation, the results showed 6 distinct factors (all above 0.80) (See Table 4.17). Again, these numbers suggested that the 14-item Relationship Value scale is a multiple-factor construct.

The scale went through the same examination procedure as described in Study One. Below is the standardized regressions and squared multiple correlations (see Table 4.18), and comparison table illustrating the fit statistics of all three different model specifications (see Table 4.19).

**Table 4.15 Study One (Seller)**  
**Construct: Relationship Value**  
**Standardized Regressions and Squared Multiple Correlations**

| Item                    |   | Construct/Factor   | Standardized Regression | Squared Multiple Correlations |
|-------------------------|---|--------------------|-------------------------|-------------------------------|
| SRV01                   | ← | Product Quality    | 0.961                   | 0.924                         |
| SRV02                   | ← | Product Quality    | 0.981                   | 0.962                         |
| SRV03                   | ← | Product Quality    | 0.964                   | 0.929                         |
| SRV04                   | ← | Product Quality    | 0.993                   | 0.986                         |
| SRV05                   | ← | Communication      | 0.981                   | 0.963                         |
| SRV06                   | ← | Communication      | 0.997                   | 0.994                         |
| SRV07                   | ← | Communication      | 0.966                   | 0.932                         |
| SRV08                   | ← | Delivery           | 1.000                   | 0.999                         |
| RV09                    | ← | Delivery           | 0.941                   | 0.886                         |
| SRV10                   | ← | Delivery           | 0.929                   | 0.862                         |
| SRV11                   | ← | Market Access      | 1.000                   | 0.999                         |
| SRV12                   | ← | Market Access      | 0.963                   | 0.927                         |
| SRV13                   | ← | Pricing            | 1.000                   | 0.999                         |
| SRV14                   | ← | Pricing            | 0.940                   | 0.884                         |
| <b>Composite Scale:</b> |   |                    |                         |                               |
| SRV15                   | ← | Global             | 0.573                   | 0.328                         |
| SRV001                  | ← | Relationship Value | 0.794                   | 0.404                         |
| SRV002                  | ← | Relationship Value | 0.575                   | 0.219                         |
| SRV003                  | ← | Relationship Value | 0.653                   | 0.427                         |
| SRV004                  | ← | Relationship Value | 0.468                   | 0.331                         |
| SRV005                  | ← | Relationship Value | 0.653                   | 0.631                         |

**Table 4.16 Study One (Seller) - Comparison of Fit Statistics**  
**Construct: Relationship Value**

| <b>Fit Measure</b> | <b>First Order</b> | <b>Second Order *</b> | <b>Composite Scale **</b> |
|--------------------|--------------------|-----------------------|---------------------------|
| Chi-Square         | 1751.46            | 366.744               | 17.498                    |
| Degree of freedom  | 91                 | 80                    | 9                         |
| CMIN/DF            | 19.247             | 4.584                 | 1.94                      |
| CFI                | 0.378              | 0.891                 | 0.944                     |
| TLI                | 0.282              | 0.876                 | 0.907                     |
| GFI                | 0.446              | 0.676                 | 0.952                     |
| RMSEA              | 0.419              | 0.186                 | 0.095                     |

\* Excluded one single-item scale: SRV15

\*\* All 15 items were included.

**Table 4.17 Study Two (Buyer) - Exploratory Factor Analysis**  
**Construct: Relationship Value**

|       | <b>Component</b> |             |             |             |             |             |
|-------|------------------|-------------|-------------|-------------|-------------|-------------|
|       | <b>1</b>         | <b>2</b>    | <b>3</b>    | <b>4</b>    | <b>5</b>    | <b>6</b>    |
| BRV01 | <b>.887</b>      | .233        | .211        | .135        | .116        | .197        |
| BRV02 | <b>.917</b>      | .241        | .199        | .099        | -.002       | .108        |
| BRV03 | <b>.889</b>      | .222        | .251        | .153        | .089        | .061        |
| BRV04 | <b>.908</b>      | .217        | .248        | .137        | .096        | .097        |
| BRV05 | .282             | <b>.912</b> | .168        | .093        | .018        | .097        |
| BRV06 | .229             | <b>.943</b> | .196        | .070        | -.017       | .002        |
| BRV07 | .216             | <b>.931</b> | .204        | .074        | .005        | .031        |
| BRV08 | .258             | .193        | <b>.880</b> | .092        | .127        | .196        |
| BRV09 | .276             | .196        | <b>.919</b> | .074        | .053        | .029        |
| BRV10 | .220             | .212        | <b>.862</b> | .211        | .095        | .035        |
| BRV11 | .209             | .104        | .109        | <b>.939</b> | .103        | .133        |
| BRV12 | .114             | .078        | .164        | <b>.964</b> | .053        | .018        |
| BRV13 | .137             | -.018       | .172        | .131        | <b>.939</b> | .229        |
| BRV14 | .305             | .086        | .181        | .152        | .300        | <b>.865</b> |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 6 iterations.

**Table 4.18 Study Two (Buyer)**  
**Construct: Relationship Value**  
**Standardized Regressions and Squared Multiple Correlations**

| Item                    |   | Construct/Factor   | Standardized Regression | Squared Multiple Correlations |
|-------------------------|---|--------------------|-------------------------|-------------------------------|
| BRV01                   | ← | Product Quality    | 0.971                   | 0.944                         |
| BRV02                   | ← | Product Quality    | 0.973                   | 0.947                         |
| BRV03                   | ← | Product Quality    | 0.965                   | 0.932                         |
| BRV04                   | ← | Product Quality    | 0.989                   | 0.978                         |
| BRV05                   | ← | Communication      | 0.955                   | 0.913                         |
| BRV06                   | ← | Communication      | 0.998                   | 0.995                         |
| BRV07                   | ← | Communication      | 0.967                   | 0.935                         |
| BRV08                   | ← | Delivery           | 1.000                   | 0.999                         |
| BRV09                   | ← | Delivery           | 0.947                   | 0.896                         |
| BRV10                   | ← | Delivery           | 0.842                   | 0.709                         |
| BRV11                   | ← | Market Access      | 1.000                   | 0.999                         |
| BRV12                   | ← | Market Access      | 0.937                   | 0.877                         |
| <b>Composite Scale:</b> |   |                    |                         |                               |
| BRV13                   | ← | Relationship Value | 0.467                   | 0.218                         |
| BRV14                   | ← | Relationship Value | 0.640                   | 0.410                         |
| BRV001                  | ← | Relationship Value | 0.777                   | 0.604                         |
| BRV002                  | ← | Relationship Value | 0.554                   | 0.307                         |
| BRV003                  | ← | Relationship Value | 0.695                   | 0.484                         |
| BRV004                  | ← | Relationship Value | 0.482                   | 0.232                         |

**Table 4.19 Study Two (Buyer) - Comparison of Fit Statistics**  
**Construct: Relationship Value**

| <b>Fit Measure</b> | <b>First Order</b> | <b>Second Order *</b> | <b>Composite Scale **</b> |
|--------------------|--------------------|-----------------------|---------------------------|
| Chi-Square         | 1270.88            | 218.354               | 32.772                    |
| Degree of freedom  | 78                 | 56                    | 9                         |
| CMIN/DF            | 16.293             | 3.899                 | 3.64                      |
| CFI                | 0.448              | 0.921                 | 0.85                      |
| TLI                | 0.356              | 0.907                 | 0.75                      |
| GFI                | 0.492              | 0.753                 | 0.901                     |
| RMSEA              | 0.383              | 0.167                 | 0.159                     |

\* Excluded 2 single-item scales: BRV13 and BRV14.

\*\* All 14 items were included.

At this point, the antecedents were incorporated with two composite scales (inter-firm knowledge sharing and relationship value) and formed the full measurement model. Table 4.20 provides the goodness-of-fit statistics for the final measurement model for the proposed model in this study. Appendix C presents the correlation matrix of the measurement scales.

### **Reliability**

Reliability is the precision, or the lack of distortion, of a measuring instrument (Kerlinger and Lee 2000). It refers to the extent to which a scale produces consistent results if repeated measurements are made (Peter 1979). Reliability depends on how much of the variation in scores is attributable to random or chance errors (Churchill 1979). High reliability is no guarantee of good scientific results, however, there can be no good scientific results without reliability (Kerlinger and Lee 2000). In this dissertation, reliability of the scales was determined in three ways. Coefficient alpha was calculated for each scale. However, since coefficient alpha tends to underestimate scale reliability, composite reliability and variance extracted were calculated as well using

**Table 4.20 Final Measurement Model Goodness-of-Fit  
The Full Model**

| <b>Fit Measure</b> | <b>Study One – Seller</b> | <b>Study Two – Buyer</b> |
|--------------------|---------------------------|--------------------------|
| Chi-Square         | 514.469                   | 505.665                  |
| Degree of freedom  | 297                       | 297                      |
| CMIN/DF            | 1.732                     | 1.703                    |
| CFI                | 0.944                     | 0.945                    |
| TLI                | 0.934                     | 0.936                    |
| GFI                | 0.756                     | 0.758                    |
| RMSEA              | 0.084                     | 0.082                    |

formulae provided by Garver and Mentzer (1999). The formulas and summary were provided in Table 4.21 and 4.22.

The construct reliability and variance extracted for the composite scale Inter-firm Knowledge Sharing and Relationship Value appeared to be lower than the rest of the constructs. The variance extracted for both the composite scales were below the 0.50 threshold. However, this was in line with Jarvis, MacKenzie and Podsakoff's (2003) suggestion that internal consistency is not implied for composite latent variables and their measures are not expected to be correlated.

## **HYPOTHESES TESTS AND STRUCTURAL MODEL ANALYSES**

With the measurement model purified and construct reliability tested, the hypotheses depicted in the theoretical model (Figure 4.1) could now be tested. Table 4.23 and Table 4.24 display standardized regression weights and fit statistics for the structural model for Study One and Study Two respectively.

**Table 4.21 Summary of Reliability Statistics**

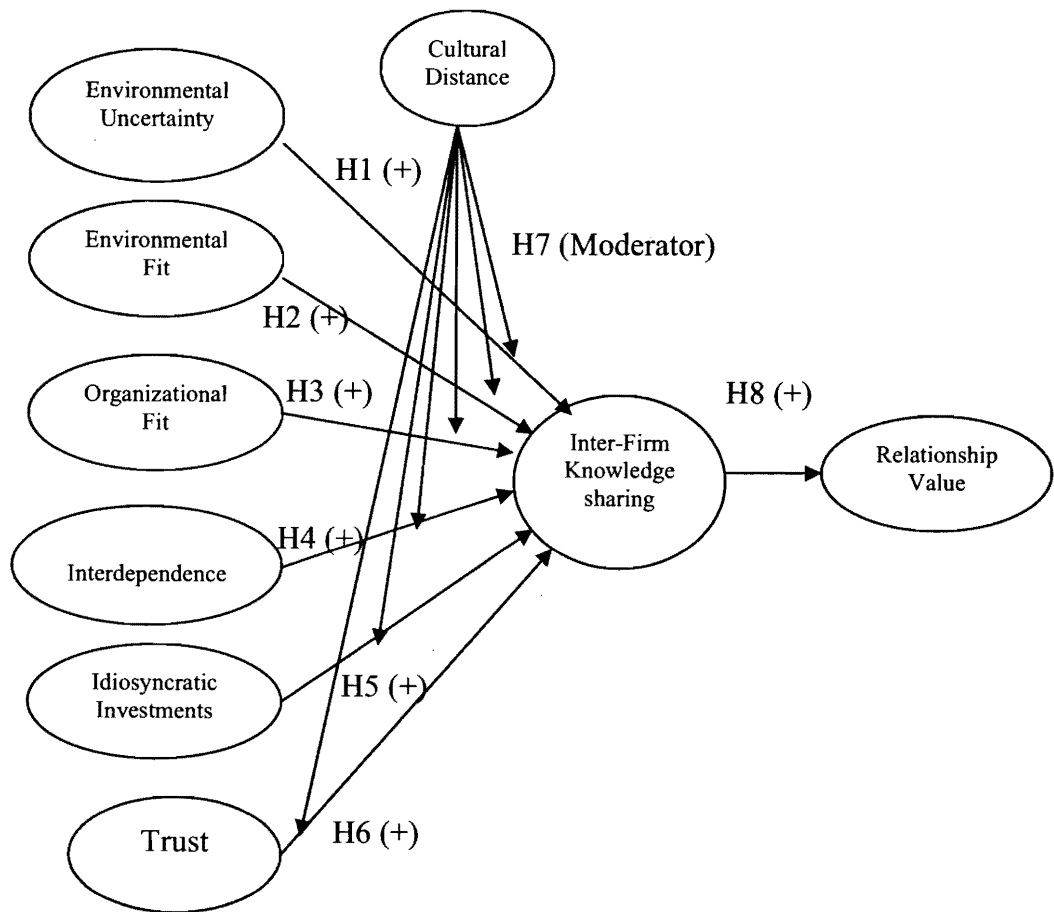
| <b>Construct</b>                     | <b>Items</b>                   | <b>Coefficient Alpha (&gt;0.70)</b> |              |
|--------------------------------------|--------------------------------|-------------------------------------|--------------|
|                                      |                                | <b>Seller</b>                       | <b>Buyer</b> |
| Environmental Uncertainty            | EU01 - EU05                    | 0.97                                | 0.97         |
| Environmental Fit                    | EF01- EF07                     | 0.97                                | 0.97         |
| Complementarity                      | CM01 – CM03                    | 0.93                                | 0.94         |
| Compatibility                        | CP01 - CP03                    | 0.92                                | 0.92         |
| Interdependence                      | ID01 - ID03                    | 0.92                                | 0.912        |
| Idiosyncratic Investments            | IV01 - IV03                    | 0.94                                | 0.914        |
| Trust                                | TS01 - TS05                    | 0.91                                | 0.924        |
| Exchange of Information              | KS01 - KS07                    | 0.98                                | 0.97         |
| Joint Sense Making                   | KS08 - KS11                    | 0.95                                | 0.96         |
| Knowledge Integration                | KS12 - KS17                    | 0.96                                | 0.95         |
| Inter-Firm Knowledge Sharing IFKS    | Composite scale                | 0.68                                | 0.67         |
| Relationship Value - Product Quality | SRV01 – SRV04<br>BRV01 - BRV04 | 0.98                                | 0.98         |
| - Communication                      | SRV05 - SRV07<br>BRV05 - BRV07 | 0.98                                | 0.98         |
| - Delivery                           | SRV08 – SRV10<br>BRV08 – BRV10 | 0.97                                | 0.96         |
| - Market Access                      | SRV11 - SRV12<br>BRV11- BRV12  | 0.98                                | 0.97         |
| - Pricing                            | SRV13 - SRV14                  | 0.96                                |              |
| Relationship Value<br>SRV<br>BRV     | Composite Scale                | 0.78                                | 0.77         |

**Table 4.22 Summary of Scale Reliability**

| <b>Construct</b>                             | <b>Composite Scale</b>             | <b>Items</b>                   | <b>Construct Reliability*<br/>(&gt;0.70)</b> |              | <b>Variance Extracted**<br/>(&gt;0.50)</b> |              |
|----------------------------------------------|------------------------------------|--------------------------------|----------------------------------------------|--------------|--------------------------------------------|--------------|
|                                              |                                    |                                | <b>Seller</b>                                | <b>Buyer</b> | <b>Seller</b>                              | <b>Buyer</b> |
| Env. Uncertainty                             | N.A.                               | EU01 - EU05                    | 0.96                                         | 0.97         | 0.86                                       | 0.87         |
| Env. Fit                                     | N.A.                               | EF01- EF07                     | 0.97                                         | 0.98         | 0.85                                       | 0.86         |
| Complementarity                              | N.A.                               | CM01 – CM03                    | 0.93                                         | 0.94         | 0.84                                       | 0.86         |
| Compatibility                                | N.A.                               | CP01 - CP03                    | 0.92                                         | 0.93         | 0.81                                       | 0.82         |
| Interdependence                              | N.A.                               | ID01 - ID03                    | 0.92                                         | 0.92         | 0.80                                       | 0.80         |
| Idiosyncratic Investments                    | N.A.                               | IV01 - IV03                    | 0.92                                         | 0.91         | 0.79                                       | 0.78         |
| Trust                                        | N.A.                               | TS01 - TS05                    | 0.92                                         | 0.93         | 0.72                                       | 0.72         |
| IFKS Factor 1: Exchange of Information       | N.A.                               | KS01 - KS07                    | 0.98                                         | 0.97         | 0.86                                       | 0.87         |
| IFKS Factor 2: Joint Sense Making            | N.A.                               | KS08 - KS11                    | 0.96                                         | 0.95         | 0.85                                       | 0.86         |
| IFKS Factor 3: Knowledge Integration         | N.A.                               | KS12 - KS17                    | 0.96                                         | 0.96         | 0.80                                       | 0.81         |
| Inter-Firm Knowledge Sharing                 | Composite Scale (IFKS Factors 1-3) | IFKS                           | 0.73                                         | 0.74         | 0.48                                       | 0.48         |
| Relationship Value Factor 1: Product Quality | N.A.                               | SRV01 – SRV04<br>BRV01 - BRV04 | 0.98                                         | 0.98         | 0.94                                       | 0.94         |
| Relationship Value Factor 2: Communication   | N.A.                               | SRV05 - SRV07<br>BRV05 - BRV07 | 0.98                                         | 0.98         | 0.96                                       | 0.95         |

**Table 4.22 Continued**

| <b>Construct</b>                                                                                                                                                                                                                                                                                                                          | <b>Composite Scale</b> | <b>Items</b>                         | <b>Construct Reliability*<br/>(&gt;0.70)</b> |              | <b>Variance Extracted**<br/>(&gt;0.50)</b> |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------------|----------------------------------------------|--------------|--------------------------------------------|--------------|
|                                                                                                                                                                                                                                                                                                                                           |                        |                                      | <b>Seller</b>                                | <b>Buyer</b> | <b>Seller</b>                              | <b>Buyer</b> |
| Relationship Value Factor 3: Delivery                                                                                                                                                                                                                                                                                                     | N.A.                   | SRV08 -<br>SRV10<br>BRV08 –<br>BRV10 | 0.96                                         | 0.95         | 0.91                                       | 0.86         |
| Relationship Value Factor 4: Market Access                                                                                                                                                                                                                                                                                                | N.A.                   | SRV11 -<br>SRV12<br>BRV11 –<br>BRV12 | 0.97                                         | 0.96         | 0.96                                       | 0.93         |
| Relationship Value Factor 5: Pricing                                                                                                                                                                                                                                                                                                      | N.A.                   | SRV13 -<br>SRV14                     | 0.97                                         |              | 0.94                                       |              |
| Relationship Value                                                                                                                                                                                                                                                                                                                        | Composite Scale        | SRV<br>BRV                           | 0.79                                         | 0.78         | 0.49                                       | 0.48         |
| <p>* Construct reliability = <math>\frac{(\sum \text{standardized loadings})^2}{(\sum \text{standardized loadings})^2 + \sum \text{measurement error}}</math></p> <p>** Variance extracted = <math>\frac{\sum \text{squared standardized loadings}}{\sum \text{squared standardized loadings} + \sum \text{measurement error}}</math></p> |                        |                                      |                                              |              |                                            |              |



**Figure 4.1 Theoretical Model**

**Table 4.23 Structural Model Statistics – Study One (Seller)**

| Hypothesized Relationship                                                |   |                    | Estimates             | c.r.   | p <   |
|--------------------------------------------------------------------------|---|--------------------|-----------------------|--------|-------|
| H1: Environmental Uncertainty                                            | → | IFKS               | 0.307                 | 5.576  | 0.001 |
| H2: Environmental Fit                                                    | → | IFKS               | 0.219                 | 3.462  | 0.001 |
| H3: Organizational Fit                                                   | → | IFKS               | 0.138                 | 2.652  | 0.010 |
| H4: Interdependence                                                      | → | IFKS               | 0.175                 | 1.048  | n.s.  |
| H5: Idiosyncratic Investments                                            | → | IFKS               | 0.247                 | 2.137  | 0.050 |
| H6: Trust                                                                | → | IFKS               | -0.061                | -1.835 | n.s.  |
| H8: IFKS                                                                 | → | Relationship Value | 0.628                 | 6.803  | 0.001 |
| IFKS = Inter-Firm Knowledge Sharing                                      |   |                    | c.r. = Critical Ratio |        |       |
| Fit Statistics:                                                          |   |                    |                       |        |       |
| CMIN = 641.68    df = 304                                                |   |                    |                       |        |       |
| CMIN/df = 2.11    CFI = 0.91    TLI = 0.90    GFI = 0.74    RMSEA = 0.10 |   |                    |                       |        |       |

**Table 4.24 Structural Model Statistics – Study Two (Buyer)**

| Hypothesized Relationship                                                 |   |                    | Estimates             | c.r.   | p <   |
|---------------------------------------------------------------------------|---|--------------------|-----------------------|--------|-------|
| H1: Environmental Uncertainty                                             | → | IFKS               | 0.296                 | 5.399  | 0.001 |
| H2: Environmental Fit                                                     | → | IFKS               | 0.222                 | 3.680  | 0.001 |
| H3: Organizational Fit                                                    | → | IFKS               | 0.122                 | 2.407  | 0.010 |
| H4: Interdependence                                                       | → | IFKS               | 0.195                 | 1.283  | n.s.  |
| H5: Idiosyncratic Investments                                             | → | IFKS               | 0.248                 | 2.358  | 0.050 |
| H6: Trust                                                                 | → | IFKS               | -0.052                | -1.637 | n.s.  |
| H8: IFKS                                                                  | → | Relationship Value | 0.578                 | 6.180  | 0.001 |
| IFKS = Inter-Firm Knowledge Sharing                                       |   |                    | c.r. = Critical Ratio |        |       |
| Fit Statistics:                                                           |   |                    |                       |        |       |
| CMIN = 611.845    df = 304                                                |   |                    |                       |        |       |
| CMIN/df = 2.013    CFI = 0.92    TLI = 0.91    GFI = 0.74    RMSEA = 0.09 |   |                    |                       |        |       |

### **Hypothesis 1**

H1: Environmental uncertainty has a positive effect on inter-firm knowledge sharing based on the positive beta path estimates of 0.307 in Study One, and 0.296 in Study Two, this hypothesis was supported at  $p < 0.001$ .

### **Hypothesis 2**

H2: The greater the degree of deviation in environmental fit between the buyer and seller's market environments, the higher the propensity for inter-firm knowledge sharing.

based on the positive beta path estimates of 0.219 in Study One, and 0.222 in Study Two, this hypothesis was supported at  $p < 0.001$ .

### **Hypothesis 3**

H3: Organizational fit has a positive effect on inter-firm knowledge sharing

based on the positive beta path estimates of 0.138 in Study One, and 0.122 in Study Two, this hypothesis was supported at  $p < 0.010$ .

### **Hypothesis 4**

H4: Interdependence has a positive effect on inter-firm knowledge sharing.

The paths from interdependence to inter-firm knowledge sharing were not significant in both studies. Therefore, this hypothesis was not supported.

### **Hypothesis 5**

H5: Idiosyncratic Investments have a positive effect on inter-firm knowledge sharing.

based on the positive beta path estimates of 0.247 in Study One, and 0.248 in Study Two, this hypothesis was supported at  $p < 0.050$ .

## **Hypothesis 6**

H6: Trust has a positive effect on inter-firm knowledge sharing.

The paths from trust to inter-firm knowledge sharing were not significant in both studies. Therefore, this hypothesis was *not* supported.

## **Hypothesis 7 - The Moderating Effect of Cultural Distance**

Testing the moderating effect of a variable in SEM is similar to testing for group differences. Identical models are used for the groups tested; however, parameters take on different values for the different groups as dictated by the theory (Arbuckle and Wothke 1999). To accomplish the test of cultural distance as a moderator required a three-step process. First, the scores for cultural distance for each dyad (buyer and seller) were calculated using Kogut and Singh (1988)'s model. Next, the data were dichotomized by grouping the CD scores into two categories - low CD, and high CD. Finally, the parameters of interest (i.e. the paths from Environmental Uncertainty, Environmental Fit, Organizational Fit, Interdependence, Idiosyncratic Investments, Trust to Inter-firm Knowledge Sharing) were labeled in order to constrain the estimates of their values, and the fit of the two nested models were estimated.

The first model was the Moderated Model; that is, the paths from EU, EF, ORGFIT, ID, IV, TS to IFKS were free to vary depending on the level of CD (high or low). For the second model, the No Moderation Model, the paths were constrained to equality under conditions of low CD and high CD (i.e. Path1 High = Path 1 Low). Therefore, the No Moderation Model constrained the path weights to be the same regardless of the level of CD, while the Moderated Model allowed differences in the level

of CD to change the path weights. The two models were then compared to determine whether there were significant differences in the fit with the data on hand. The nested model comparison showed no significant differences between the Moderated Model and the No Moderation Model for both Study One and Study Two.

Therefore,

H7: The effects of environmental factors and interorganizational properties on inter-firm knowledge sharing were not moderated by cultural distance

this hypothesis was not supported.

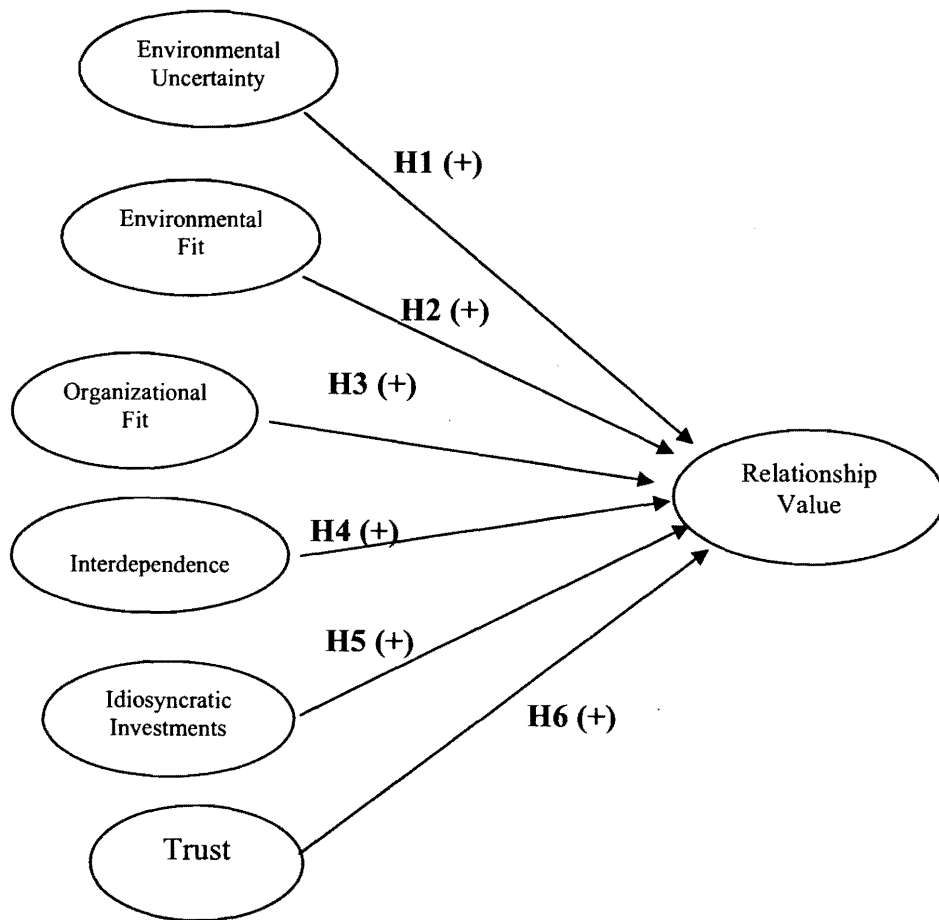
### **Hypothesis 8**

H8: Inter-firm knowledge sharing has a positive effect on Relationship Value

based on the positive beta path estimates of 0.628 in Study One, and 0.578 in Study Two, this hypothesis was strongly supported at  $p < 0.001$ .

### **A RIVAL MODEL**

It has been suggested that researchers should compare rival models and not just test a proposed model (Bollen and Long 1992; Rust, Lee and Valente 1995). According to the procedure presented by Morgan and Hunt (1994), a rival model is one in which the precursors affect relationship value directly. In the proposed model, the effects of environmental uncertainty, environmental fit, organizational fit, interdependence, idiosyncratic investments, and trust operate through inter-firm knowledge sharing. In the rival model (Figure 4.2), there are no indirect effects. Inter-firm knowledge sharing is not mediating any of the relationships. As suggested by researchers, the most common statistical tests for model comparison between a proposed model and a rival model are:



**Figure 4.2 A Rival Model**

(1) overall fit of the competing models relative to degree of freedom, (2) number of hypothesized parameters that are significant, and (3) ability to explain variance in the outcome variables (Morgan and Hunt 1994; Rust, Lee and Valente 1995).

The hypotheses test results are reported in Table 4.25 (for Study One) and Table 4.26 (for Study Two) comparing with the results derived from the proposed theoretical model.

The overall results provided stronger support for the theoretical model proposed in this study than to the rival model.

## **SUMMARY**

The structural equation model was analyzed in two steps per Anderson and Gerbing (1988). In the antecedent model in Study One, analysis of the measurement model revealed error terms of 2 items each in the EF (EF04 and EF05) and EU (EU02 and EU03) scales needed to be correlated. This resulted in an adequate overall fit (RMSEA = 0.078, CFI = 0.944, TLI = 0.936, GFI = 0.746, CMIN/DF = 1.629). Similar treatment was necessary in Study Two, and that also resulted in an adequate overall fit (RMSEA = 0.076, CFI = 0.947, TLI = 0.939, GFI = 0.749, CMIN/DF = 1.59). Both the CFI and TLI are above 0.90. GFI with a value close to 1 would be desirable. Some researchers cautioned that GFI values can be overly influenced by sample size (Fan, Thompson, and Wang 1999).

Following Selnes and Sallis (2003)'s approach to the IFKS scale and the argument provided by Matsuno and Mentzer (2000), the IFKS measurement items were aggregated for hypothesis testing.

**Table 4.25 Study One (Seller)**  
**Statistical Comparison between the Theoretical Model and the Rival Model**

|                                                     | <b>Theoretical Model</b>           | <b>The Rival Model</b> |
|-----------------------------------------------------|------------------------------------|------------------------|
| H1 to H6:<br>No. of hypothesized<br>paths supported | Four<br>(including H1, H2, H3, H5) | One<br>(H1 only)       |
| Fit Statistics:                                     |                                    |                        |
| CMIN/df                                             | 2.11                               | 2.105                  |
| CFI                                                 | 0.913                              | 0.914                  |
| TLI                                                 | 0.900                              | 0.900                  |
| RMSEA                                               | 0.103                              | 0.103                  |
| R <sup>2</sup> of<br>Relationship Value             | 0.395                              | 0.391                  |

**Table 4.26 Study Two (Buyer)**  
**Statistical Comparison between the Theoretical Model and the Rival Model**

|                                                     | <b>Theoretical Model</b>           | <b>The Rival Model</b> |
|-----------------------------------------------------|------------------------------------|------------------------|
| H1 to H6:<br>No. of hypothesized<br>paths supported | Four<br>(including H1, H2, H3, H5) | One<br>(H1 only)       |
| Fit Statistics:                                     |                                    |                        |
| CMIN/df                                             | 2.013                              | 2.022                  |
| CFI                                                 | 0.920                              | 0.919                  |
| TLI                                                 | 0.907                              | 0.906                  |
| RMSEA                                               | 0.09                               | 0.09                   |
| R <sup>2</sup> of<br>Relationship Value             | 0.334                              | 0.349                  |

The Relationship Value scale (SRV and BRV) was a new scale developed and tested in this study. Three different ways of model specification were examined (first order model, second order model, composite scale model) and it was concluded that the composite scale model produced the most preferred fit statistics. At the same time, the composite nature of the measurement model allowed the preservation of the richness and the multi-dimensional characteristics of the scale, based upon literature review and qualitative assessment. There existed opportunities for further examination using a different sample set and specification. (Further suggestions are presented in Chapter 5). The final full measurement model revealed that there was an adequate fit between the model and the data set.

The theoretical model strongly supported the contention of this dissertation that inter-firm knowledge sharing has a positive effect on Relationship Value, from both the sellers' and buyers' perspectives. In terms of antecedents to inter-firm knowledge sharing, the results from both studies showed that environmental uncertainty, environmental fit, organizational fit, and idiosyncratic investments were all positively related to inter-firm knowledge sharing. These findings suggested strong consensus between the buyers and sellers. Discussions of the conclusions and contributions from the research along with opportunities for future research are presented in Chapter 5.

## **CHAPTER FIVE**

### **CONCLUSIONS AND IMPLICATIONS**

This dissertation set out to understand more deeply the phenomenon of inter-firm knowledge sharing between a vertical dyad in a cross-border supply chain. A great deal of research has been conducted on interorganizational relationships in marketing, channels, and logistics literature that attempts to explain the necessity for firms to take on a more collaborative approach when dealing with their trade partners. This research is distinct from previous studies on collaborative relationships in several ways : (1) the study surveys the perceptions from both sides of the vertical dyad in a supply chain; (2) it uses relationship value as the outcome variable, versus a more-narrowly defined outcome (such as profit performance, or operational efficiency); (3) it explores the concept of relationship value from both the perspectives of the buyers and the sellers (treating suppliers as customers); (4) the dyads come from a strictly cross-border setting. This setting provides further insights to our understanding on the effects of a highly turbulent global business environment and cultural distance on firms' struggle to build a higher level of collaborative relationships with their trade partners in spite of the high risks and dilemma associated with inter-firm knowledge sharing.

The theoretical model presented in Chapter 3 and its associated research hypotheses were deduced from the literature review presented in Chapter 2. The eight hypotheses are summarized in Figure 5.1.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Facilitating conditions for inter-firm knowledge sharing:</b></p> <p><b>H1:</b> Environmental uncertainty has a positive effect on inter-firm knowledge sharing</p> <p><b>H2:</b> The greater the degree of deviation in environmental fit between the buyer and seller's market environments, the higher the propensity for inter-firm knowledge sharing</p> <p><b>H3:</b> Organizational fit has a positive effect on inter-firm knowledge sharing</p> <p><b>H4:</b> Interdependence has a positive effect on inter-firm knowledge sharing</p> <p><b>H5:</b> Idiosyncratic investments have a positive effect on inter-firm knowledge sharing</p> <p><b>H6:</b> Trust has a positive effect on inter-firm knowledge sharing</p> |
| <p><b>Moderator:</b></p> <p><b>H7:</b> The effects of environmental factor and interorganizational properties on inter-firm knowledge sharing are moderated by cultural distance</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <p><b>The effects of inter-firm knowledge sharing:</b></p> <p><b>H8:</b> Inter-firm knowledge sharing has a positive effect on relationship value</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**Figure 5.1 Summary of Hypotheses**

The theoretical model was then tested using a quantitative survey in an effort to answer the research questions stated in Chapter 1. Specifically, this research seeks to answer the following two research questions:

(1) What are the facilitating conditions that enhance the level of inter-firm knowledge sharing among global supply chain partners?

(2) What effect does inter-firm knowledge sharing have on relationship value?

This chapter discusses the results achieved in light of the research questions and their theoretical and managerial implications.

The following section first presents a discussion of the findings from the theoretical testing and for each of the eight hypotheses tested. The contributions of the research are then presented, followed by suggestions for future research to address the limitations of this study. Finally, concluding remarks are offered.

## **DISCUSSION OF FINDINGS**

### **Hypothesis 1**

Hypothesis 1 posited a positive relationship between environmental uncertainty and inter-firm knowledge sharing. This hypothesis was supported in both Study One and Two. The findings substantiated previous research on the relationship between environmental uncertainty and various forms of bilateral collaboration (Barney 1991, Heide and John 1988, Penrose 1959, Pfeffer and Salanick 1978, Wernerfelt 1984, Jap 1999). Flexibility and ability to adapt rapidly are important in an uncertain environment. In a business environment faced with rapid technology advancement and changes, firms

tend to be engaging in more knowledge sharing activities with each other to cope better with constant change, and to better satisfy customer needs.

## **Hypothesis 2**

Hypothesis 2 posited a positive relationship between environmental fit and inter-firm knowledge sharing. This hypothesis was supported. From the buyers' perspective, global sourcing literature suggests that firms are moving toward an integrated global sourcing strategy to acquire and sustain cost competitiveness, quality improvement, increased exposure to worldwide technology, and delivery and reliability improvement (Kotabe 1989, 1992). Some firms engage in global sourcing for the reason of taking advantage of government incentives, exploiting or guarding against currency fluctuations, and diversifying supply sources to spread risks (Cagusgil, Yaprak and Yeoh 1993). Evidently this has become a widespread trend in many industries. To mitigate the liability of foreignness, or the liability arising from dealing with dissimilar environments that associated with higher risk, firms are motivated to further reduce transaction costs by building a strong knowledge sharing link with their foreign partners.

From the sellers' perspective, some firms choose to expand markets into new territories that are less similar to their home country conditions. This type of market diversification offers flexibility to shift market penetration efforts. At the same time, deviation (or dissimilarity) between exchange partners' home market environment inherently come with higher unpredictability. This explains the notion that the greater the degree of deviation in environmental fit between the buyer and seller's market environment, the higher the propensity for inter-firm knowledge sharing.

### **Hypothesis 3**

Hypothesis 3 posited that organizational fit has a positive effect on inter-firm knowledge sharing. This hypothesis was supported by the data in both studies. Resource dependence theory, which is heavily researched in interorganizational relationship literature, posits that when resources and competencies are not readily or sufficiently available within the firm itself, firm is likely to establish ties with other organizations. In our study, it was found that both buyers and sellers are drawn to pursue a closer relationship with their exchange partners in order to fulfill their needs for a valuable capability to complete their tasks.

The other important dimension of organizational fit is the compatibility of exchange partners, assessed in several ways such as operating strategy, corporate cultures, management styles etc. (Parkhe 1993). Our findings from both Study One and Two substantiated previous studies that compatibility allows firms to actually capitalize on the knowledge sharing potential offered by the complementarity of capabilities between them (Kale, Singh and Perlmutter 2000).

### **Hypothesis 4**

Hypothesis 4 posited that interdependence has a positive effect on inter-firm knowledge sharing. This was not supported by the data in both Study One and Two. This finding is against conventional wisdom and is intriguing.

One possible explanation is that low interdependence magnitude means each firm has low power and the dependence levels are symmetric. As long as each firm correctly acknowledges the inherent nature of such relationships, they may function rather

smoothly without problems (Frazier 1999), and thus would not affect the levels and intensity of inter-firm knowledge sharing. Furthermore, as pointed out by Spekman and Sawhney, "While interdependence is an antecedent to cooperation, it is also a precursor to conflict" (1990, p.6). Not having to deal with the potential conflicts inherited in interdependence, firms might have found it easier and more efficient to conduct inter-firm knowledge sharing activities to better cope with the problems and challenges arising from the external environment.

On the other hand, interdependence may be found significant in a context where the variability in interdependence is higher, other than the three industries surveyed in this study. Further research is needed about interdependence in different contexts.

### **Hypothesis 5**

Hypothesis 5 posited that idiosyncratic investments have a positive effect on inter-firm knowledge sharing. This was supported in both Study One and Two. The finding substantiated previous research in that idiosyncratic investment is one of the constructs that has been identified as potentially important in driving firms' relationship commitment, especially in a global context (Aulakh, Kotabe and Sahay 1997; Lin and Germain 1999; Skarmetas, Katsikeas and Schlegelmilch 2002). The nonfungible nature of these investments means that they lose their value in the event when the relationship is terminated. Such investments thus bind the firms to the exchange relationship, and create a lock-in condition. They are also useful in minimizing opportunistic behavior and further motivate inter-firm knowledge sharing as this might be a way to enhance their

return on investments beyond the initial motivation for the investment by both the buyers and sellers.

### **Hypothesis 6**

Hypothesis 6 posited that trust has a positive effect on inter-firm knowledge sharing. This hypothesis was not supported by the data in both Study One and Two. This finding was intriguing as mainstream thinking states that trust is a facilitator of effective cooperative behavior in customer-supplier relationships (Dwyer, Schurr, and Oh 1987). The construct was determined to be valid and reliable, but other factors might explain the nonsignificant finding. In Selnes and Sallies (2003)'s study, it was found that trust facilitates relationship learning (trust → relationship learning), and has a positive direct effect on relationship performance (trust → relationship performance). It was found in the same study that the positive effect of relationship learning on relationship performance is moderated (reduced) under conditions of high trust. The rationale provided in that study was that high levels of trust might have "hidden costs" that limit the effectiveness of working relationship. High level of trust might produce a lack of critical information search. Two parties' development of high levels of trust is usually accompanied by strong, positive emotions and liking (Jones and George 1998). In such atmospheres, a risk exists that negative or critical information is not shared for fear of endangering the "good atmosphere" of the relationship.

Interestingly, in this current study, it was found that trust does not have a significant positive effect on inter-firm knowledge sharing, which means firms did not consider trust an important factor driving higher level of inter-firm knowledge sharing.

This could be explained by the 'hidden costs' rationale provided by Selnes and Sallies (2003). It could also be due to the fact that in the three industries (consumer durable, industrial chemicals, and industrial packaging) surveyed in this study, the industrial characteristics rendered firms the dire need to work closely with their exchange partners regardless of the level of trusts. Another potential explanation is that trust is a less tangible factor (relative to complementary capabilities, or idiosyncratic investments) and only matters at different points in the relationship. Perhaps intangible assurance such as trust is more effective at reducing uncertainty in early phases, but less effective over time as the dyad members consolidate an interaction history and deepen their knowledge of each other. The direct experience from ongoing day-to-day interactions could be more powerful, concrete indications for guiding the decision to build a more intense level of inter-firm knowledge sharing with each other (see Jap 1999).

The construct of trust definitely deserved to be examined further in future research using a different set of sample frame. More knowledge is needed about trust under different relationship conditions.

### **Hypothesis 7**

Hypothesis 7 posited that the effects of environmental factors and interorganizational properties on inter-firm knowledge sharing are moderated by cultural distance. Surprisingly, the hypothesis was not supported by the data. In a hindsight, some observations in the challenges confronting IB researchers offered several probable explanations to this finding.

The findings seem to suggest that one of the major effects of globalization is the creation of a new identifiable class of persons who belong to an *emergent global culture* (Bird and Stevens 2003). As membership in this new global culture rises, many critics find a distinct threat to national cultures, resulting quite possibly in their eventual obsolescence. In the management of multinational corporations, it is not uncommon to find an increasing number of managers who often describe themselves as being genuinely bicultural or even multi-cultural. Several interesting examples were found in the course of this study: an executive holding a top management position for an European company's regional office in Asia was actually born and raised in South America, and received his higher education and professional training in the United States. Other examples reflected similar complexity in a MNC manager's cultural makeup: an executive originally from China had a MBA from one of the top business schools in the United States, and is currently holding an expatriate assignment for a Japanese firm in Singapore. More and more MNCs are managed by bi-cultural and multi-cultural expatriates. It becomes a real challenge for researchers to accurately tease out the national culture of the unit of analysis –whether it is at the firm level, or at the level of individual executives.

### **Hypothesis 8**

Hypothesis 8 posited that inter-firm knowledge sharing has a positive effect on relationship value. In both Study One and Two, this hypothesis was strongly supported by the data. The findings underscore the importance of inter-firm knowledge sharing on enhanced relationship value. As Powell, Koput and Smith-Doerr (1996) suggest, "when

the knowledge base of an industry is both complex and expanding, and the sources of expertise are widely dispersed, the locus of innovation will be found in networks of learning (i.e. inter-firm knowledge sharing), rather than in individual firms." Market driven organizations recognize that the responsibility for creating and delivering superior value does not lie only within a firm across its different functional departments (Craven 1998). Linked firms within supply chains share that same responsibility in coordination of value understanding, creation and delivery across the whole supply chain (Flint 2004).

## **RESEARCH CONTRIBUTIONS**

In filling existing gaps in the global supply chain literature, this study takes a comprehensive approach and makes some important contributions. The findings extend the body of knowledge on interorganizational learning, and this has theoretical and managerial implications, which are discussed in the following section.

### **Research Implications**

#### ***A Multi-Paradigm Perspective on Interorganizational Learning***

In the way of theoretical contribution, the research successfully links several theories (resource dependence theory, knowledge based view, transaction cost economics, relational exchange view, and political economy paradigm) by providing empirical support that those variables that are both interorganizationally oriented and environmentally oriented effect firms' knowledge sharing activities with their vertical supply chain partners. While those theories have in the past been linked with studies on organizational behaviors, their relationship with *interorganizational* learning in an

international context, with all of the complex global environmental factors that drives firm performance in the marketplace, has yet to be determined.

### ***Perceptions and Measures of Relationship Value***

This study also set a foundation for future research on measuring the perceptions of relationship value. Extending from Ulaga (2003)'s qualitative study on customer value in a business-to-business context, this study shows that the measurement of value should capture the *various facets* of the construct (including both functional benefits pertaining to products and services, as well as relationship benefits), and research should rely on multidimensional scales of value rather than overall measures of the constructs (Ulaga 2003).

### ***The Implications of Emergent Global Culture on IB Research***

The absence of the moderating effect of cultural distance on inter-firm knowledge sharing suggests an interesting phenomenon that deserves attention in future research on global firms. The identification of an emerging global culture presents several challenges for scholars in IB research. Our theories of cultural influence and interaction need to be more sophisticated and take into account the multiple cultures that managers bring with them to an organizational setting (Sackman et al., 1997), and the impact of those different cultural identities for within-culture interactions as well as between-culture interactions. Greater emphasis needs to be placed on explicating the core values that global managers hold because such values will not be easily discernable from the traditional markers of age, ethnic group, national origin, and so on. Bird and Stevens (2003) suggest that global managers tend to have values that are more in common with other global managers than

with those of their own countries or origin, making it much more difficult to assume that the traditional sets of underlying values, beliefs and attitudes are operating in any given situation.

Bird and Stevens (2003) further suggest that globalization is leading to significant cultural cross-pollination (Bird and Stevens 2003). “Thus, cultures do not operate as uncorrelated independent variables, even though we have historically treated them this way. For example, studies examining U.S. and Mexican business practices would typically be analyzed as if Mexican and U.S. cultures are independent. But they are not. The interaction (or cross-pollination) between the two countries’ cultures through the years has created a unique dynamic that currently influences US – Mexican interactions” (p. 404).

Bird and Stevens (2003)’s observation also suggests several specific competencies and traits among global managers with bicultural or multicultural backgrounds. These traits include self-confidence, pragmatism, flexibility and openness, as well as a greater capacity for trust. This might be one possible explanation why trust was found in this study to be a non issue – therefore, no significant effect, on inter-firm knowledge sharing.

### ***Horizontal Segmentation Versus Vertical Segmentation***

In this regards, perhaps it is more meaningful for both researchers and practitioners in global firms to explore segmentation in customer relationship management as well as supplier relationship management at the horizontal level (across country borders), rather than at the traditional vertical level (country by country). As

suggested in previous discussions, national cultures do not operate as uncorrelated independent variables due to significant cultural cross-pollination through globalization. Compared to national culture, geographical characteristics (using GIS), infrastructure development, transitional versus mature economies, might become a set of more meaningful and useful variables for global firms to segment their customers and suppliers at the regional level (instead of country level), and come up with more effective and efficient relationship management strategies.

### **Managerial Implications**

The results underscore the importance of inter-firm knowledge sharing in enhancing relationship value, benefiting *both* the buyers and sellers in a vertical dyadic relationship. Practitioners are typically apprehensive about investing time and resources into closer relationships as they usually do not see a quick financial return on these investments. Besides, firms have to deal with the risks and dilemma associated with intense level of inter-firm knowledge sharing, such as compromising trade secrets, losing control, losing proprietary information, and even losing revenue and competitive edge. Collectively, the data in this study paint a picture of inter-firm knowledge sharing as a source of competitive advantage through enhanced relationship value. Several researchers have made the case that managing a business to deliver superior value to targeted customers can lead to improved performance in the long run (Gale 1994; Kaplan and Norton 1996; Naumann 1995; Slywartzky and Morrison 1997; Woodruff 1997). The efforts and investments put into inter-firm knowledge sharing enable *both* sides of the dyads to receive higher values through the exchange relationships. These outcomes are

important motivational reasons for firms to engage in inter-firm knowledge sharing in spite of the risks and dilemma they have to face.

The next implication is that environment has a powerful influence on the dyad's decision to engage in inter-firm knowledge sharing. Since the Asian financial crisis took place in 1997, the world economy has continued to stagnate with more uncertainties. The crisis was followed by the terrorist attack on the United States on September 11, 2001. Argentina's financial crisis worsened in 2002. The world economy was brought into a global slowdown. The aftermath of the U.S.-led war against Iraq, and the severe acute respiratory syndrome (SARS) spreading from China in 2003 continue to have a negative effect on the recovering of the weak world economy. As a result, Asia's once blooming economies are still fragile, liquidity problems are hurting regional trade, and losses from Asian investments are eroding profits for many multinational corporations. Environmental uncertainty and the degree of deviation in environmental conditions between the buyer and seller's market environments, both positively impact firms' behavior in inter-firm knowledge sharing. The era of globalization left most managers scrambling to understand the nature of the forces of change in their particular businesses, what responses were most appropriate, and above all, how they could manage the more complex strategies and operations on an ongoing basis in a time of major environmental change. Firms need flexibility and ability to adapt rapidly in such uncertain environment. This study suggests that engaging in inter-firm knowledge sharing with exchange partners could be one avenue to gain some control over externalities or to respond more quickly to market changes and challenges.

Contrary to common belief and practice in customer/supplier relationship management, we need to take a more practical look at the possible hidden costs of high levels of trust and interdependence. Other tangible factors (such as organizational fit, idiosyncratic investments) might be better indicators for firms to consider while structuring the relationships with their trade partners.

For firms dealing with overseas suppliers and/or customers, this study offers an incentive to take a closer look at the relevance of segmenting their relationship management at the horizontal level.

## **LIMITATIONS AND FUTURE RESEARCH OPPORTUNITIES**

There are several limitations to consider with regard to the findings. These limitations also provide opportunities as part of an ongoing stream for future research.

First, the two-group approach used in this study informs the understanding of how the model operates on each side of the dyad. Future research could explore the model at the dyadic level by examining one standard measurement for the construct customer value or relationship value, and assess whether the construct is comparable across buyers and sellers. This will involve a multiple group confirmatory factor analysis to assess factorial invariance across the two groups.

Second, the study is one of a few that takes a dyadic approach in conceptualizing interorganizational relationships. Dyadic model specification is still at an early stage. Although the conceptual arguments are based upon prior research in several different streams of literature, a specification error could have been made or an important variable omitted from the conceptualization. There are many other factors that could have an

impact on dyadic behaviors and strategic outcomes of a collaborative relationship in any supply chain. The intention of this study was not to be exhaustive in laying out all the antecedents, but to study a subset of those possible variables and the effects of their interaction, so as to provide researchers and managers a better understanding of such a rich and complex phenomenon. Conversely, the comprehensive nature of the model suggested in this study also might have diluted the importance of some of the independent variables. Should the model take a more focused examination only on interorganization properties between the dyad, would each of these variables (trust, organizational fit, interdependence) then have different impact on the level of inter-firm knowledge sharing?

In scale development and measurement specification using SEM, some researchers suggested that many of the observed indicators studied in the field of social science can actually be treated as either reflective or formative (Fornell and Bookstein 1982). Jarvis, MacKenzie and Podsakoff proposed a set of decision rules to determine whether a construct is formative or reflective (2003, p. 203). However, it is also noted that very often the answers or conclusions to these decision rules are not clear-cut or easy to derive in any study. There are also several unique problems associated with the modeling of formative indicator constructs (such as, additional reflective indicators, when conceptually appropriate, should be created) (see Jarvis, MacKenzie and Podsakoff, 2003, p.213). Future research is needed to examine both the IFKS and Relationship Value scales to further determine whether a formative indicator measurement model would be more appropriate. To implement the solutions suggested by Jarvis, MacKenzie and

Podsakoff (2003) would require researchers to be familiar enough with the identification problem to anticipate the need for either additional items or constructs.

The conclusions based on the model are only as sound as the validity and reliability of the measures. The data analysis provided support for the reliability and validity of the measures and scales used in or developed for this study. However, as often happens in every survey research, there were some weaknesses with the new measures. The validity and reliability of measures are better concluded through multiple studies (Mentzer and Flint 1999). The measures in this study need to be tested again on similar as well as different populations than that chosen for this dissertation.

An additional limitation of structural equation modeling that provides an opportunity for future research is the assumption of causality. Any causal relationship tested in this study is only as valid as the theoretical justification guiding the research. Causation between or among variables cannot be concluded unless *all* possible constructs involved in any way with the theory are included in the model to be tested (Anderson and Gerbing 1988). Additionally, many alternative models must be examined to ensure that those paths hypothesized to exist are indeed nonzero and those paths that are omitted from the theoretical model are zero. It is not feasible to accomplish all these conditions in one single study.

In this study, we are only able to provide a snapshot of ongoing processes and not measures of the same process over time. To more effectively test causal links, longitudinal research should be conducted. A time series study could include testing for the reinforcement loop in the model. For example, do increased levels of relationship value result in increased level of inter-firm knowledge sharing? Longitudinal research

could also help to determine the level at which investments in time/effort/money spent in inter-firm knowledge sharing results in diminishing returns. This will also help address the issues on whether some of the antecedent variables indeed are having a curvilinear relationship with the focal construct.

This study relied on self-reports. Although self-reports have been widely used and shown to be reliable, it would be enlightening to add external measures such as financial performance indicators through secondary data. Collecting dependent and independent variable data from different respondents would also help eliminate the potential problem arising from common method bias.

Another limitation is the generalizability of single research study results. The study was limited to one dyadic link in the supply chain to minimize extraneous variation. Future studies should test other different tiers in the supply chain, or perhaps even test relationships involving more entities within the supply chain.

## **FUTURE RESEARCH ON GLOBAL SUPPLY CHAIN MANAGEMENT**

Continued growth of outsourcing was evident in many industries during the post-study discussions with some of the participants. The extension of offshore production to international customer service operations has been established. But what forms will global outsourcing take in the future? The global arena offers supply chain managers significant opportunities to innovate. Innovation in the context of global supply chains has unique aspects. Participation in a supply chain requires collaboration and co-development (intense level of inter-firm knowledge sharing) which is getting attention as a viable methodology for working closely together across company boundaries. The

effect of multi-country representation, and the mix of cultures involved, is not well understood. The conditions under which environmental circumstances improve or diminish prospects for new development success is not known. These are process issues that warrant investigations through longitudinal research. Global supply chains no doubt provide a natural laboratory for studying multi-cultural multi-firm innovation.

Global supply chain management has also raised numerous ethical concerns that require further investigations. Availability and the use of information for making joint decisions is a major issue. The study provides evidence that knowledge sharing is vital to supply chain operations. However, information privacy (especially those related to the end consumers) is viewed differently in different parts of the world. Agreements will be necessary yet difficult to reach because of the emotional nature of privacy rights. These rights are rooted in culture and applied in local laws. Privacy as an obstacle to information flows in global supply chains needs considerable attention.

There are also macro implications of knowledge sharing in global supply chain settings. The author felt this is one of the most important topic areas. Global supply chain management has the potential to be an important mechanism that could assist emerging and transitional economies in reaching the next stage of development. Knowledge gained through cooperative ventures has great impact on operations locally, regionally, and would also open tremendous opportunities on a global scale. The connection between supply chain success and global trade prowess needs to be further explored. The role of inter-firm knowledge sharing in supply chain success may be a key. Learning organizations throughout the world need to be analyzed in order to gain a better

understanding of how they could contribute to economic development through global supply chain collaboration.

## **CONCLUDING REMARKS**

The primary contribution of this dissertation is that it provides a comprehensive and empirically tested theoretical foundation from which to conduct future research on the phenomenon of interorganizational collaboration in global supply chains. This research foundation is also beneficial to practitioners who are searching for tools needed for the task of ensuring their firms' survival and success in the highly turbulent global business environment. Finally, it is anticipated that the dissertation will serve as the beginning of a long and rewarding stream of research examining interorganizational relationships within global supply chain management.

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## LIST OF REFERENCES

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## **APPENDICES**

## APPENDIX A

### PRE-TEST

#### Descriptive Statistics (1) \*

| Item | Mean Statistics | Std. Dev Statistics | Skewness Statistics | Std. Error | Kurtosis Statistics | Std. Error |
|------|-----------------|---------------------|---------------------|------------|---------------------|------------|
| KS01 | 5.13            | 1.698               | -.834               | .285       | -.482               | .563       |
| KS02 | 5.04            | 1.727               | -.546               | .285       | -1.037              | .563       |
| KS03 | 4.33            | 1.779               | -.309               | .285       | -1.060              | .563       |
| KS04 | 4.89            | 1.761               | -.518               | .285       | -.870               | .563       |
| KS05 | 5.38            | 1.607               | -.840               | .285       | -.281               | .563       |
| KS06 | 4.59            | 1.793               | -.444               | .285       | -.965               | .563       |
| KS07 | 4.15            | 1.932               | -.336               | .285       | -1.199              | .563       |
| KS08 | 4.88            | 1.833               | -.352               | .285       | -1.291              | .563       |
| KS09 | 4.82            | 1.867               | -.422               | .285       | -1.250              | .563       |
| KS10 | 4.75            | 1.738               | -.403               | .285       | -.983               | .563       |
| KS11 | 5.08            | 1.948               | -.683               | .285       | -.927               | .563       |
| KS12 | 5.00            | 1.927               | -.579               | .285       | -1.093              | .563       |
| KS13 | 4.80            | 1.924               | -.578               | .285       | -1.004              | .563       |
| KS14 | 4.97            | 1.699               | -.711               | .285       | -.697               | .563       |
| KS15 | 4.32            | 1.771               | -.478               | .285       | -1.294              | .563       |
| KS16 | 5.07            | 1.900               | -.657               | .285       | -.973               | .563       |
| KS17 | 4.80            | 1.939               | -.427               | .285       | -1.203              | .563       |
| EU01 | 3.94            | 1.904               | .096                | .285       | -1.476              | .563       |
| EU02 | 4.08            | 1.977               | .074                | .285       | -1.472              | .563       |
| EU03 | 4.39            | 2.011               | .088                | .285       | -1.511              | .563       |
| EU04 | 4.34            | 1.992               | -.105               | .285       | -1.495              | .563       |
| EU05 | 4.48            | 1.843               | -.205               | .285       | -1.327              | .563       |
| EF01 | 4.14            | 1.915               | -.056               | .285       | -1.462              | .563       |
| EF02 | 4.38            | 1.945               | -.270               | .285       | -1.530              | .563       |
| EF03 | 4.28            | 2.051               | -.239               | .285       | -1.470              | .563       |
| EF04 | 4.24            | 1.777               | -.295               | .285       | -1.438              | .563       |
| EF05 | 4.21            | 1.804               | -.311               | .285       | -1.407              | .563       |
| EF06 | 4.20            | 1.687               | -.081               | .285       | -1.480              | .563       |
| EF07 | 4.27            | 1.740               | -.342               | .285       | -1.535              | .563       |
| CM01 | 5.55            | 1.432               | -1.348              | .285       | 1.612               | .563       |
| CM02 | 5.66            | 1.298               | -1.316              | .285       | 1.650               | .563       |
| CM03 | 5.62            | 1.534               | -1.405              | .285       | 1.582               | .563       |
| CP01 | 4.86            | 1.334               | -.961               | .285       | .462                | .563       |
| CP02 | 4.62            | 1.291               | -.846               | .285       | .850                | .563       |
| CP03 | 4.25            | 1.441               | -.725               | .285       | -.481               | .563       |

### Descriptive Statistics (1) Continued

|      |      |       |        |      |       |      |
|------|------|-------|--------|------|-------|------|
| ID01 | 5.55 | 1.689 | -1.196 | .285 | .233  | .563 |
| ID02 | 5.14 | 1.959 | -.836  | .285 | -.774 | .563 |
| ID03 | 5.54 | 1.689 | -1.170 | .285 | .050  | .563 |
| IV01 | 4.97 | 1.732 | -.669  | .285 | -.824 | .563 |
| IV02 | 4.97 | 1.715 | -.672  | .285 | -.675 | .563 |
| IV03 | 5.01 | 1.660 | -.774  | .285 | -.573 | .563 |
| TS01 | 5.01 | 1.304 | -.783  | .285 | -.324 | .563 |
| TS02 | 5.48 | 1.229 | -1.233 | .285 | 1.746 | .563 |
| TS03 | 5.52 | 1.340 | -1.366 | .285 | 1.408 | .563 |
| TS04 | 5.34 | 1.082 | -1.345 | .285 | 1.615 | .563 |
| TS05 | 5.25 | 1.065 | -1.259 | .285 | 1.389 | .563 |
| SP01 | 5.25 | .906  | -.294  | .285 | .349  | .563 |
| SP02 | 5.21 | .925  | -.216  | .285 | .119  | .563 |
| SP03 | 5.27 | .999  | -.567  | .285 | .078  | .563 |
| SP04 | 5.25 | 1.024 | -.534  | .285 | -.178 | .563 |
| SP05 | 4.93 | 1.073 | -.926  | .285 | 1.612 | .563 |
| SP06 | 4.89 | 1.049 | -.379  | .285 | .083  | .563 |
| SP07 | 4.93 | .976  | -.520  | .285 | -.322 | .563 |
| SP08 | 4.90 | .988  | -.255  | .285 | -.413 | .563 |

\* Note:

In the pre-test, sample size N = 71 (combining buyers and sellers) for these variables:  
 EU = Environmental Uncertainty, EF = Environmental Fit, CM = Complementarity,  
 CP = Compatibility, ID = Interdependence, IV = Idiosyncratic Investments, TS = Trust,  
 KS = Inter-firm Knowledge Sharing

Descriptive statistics were calculated separately from the buyers and sellers' responses for the variable Relationship Value.

## PRE-TEST

### Descriptive Statistics (2) \*\* (for the variable Relationship Value - Buyer' Perspective)

| Item  | Mean Statistics | Std. Dev Statistics | Skewness Statistics | Std. Error | Kurtosis Statistics | Std. Error |
|-------|-----------------|---------------------|---------------------|------------|---------------------|------------|
| BRV01 | 5.31            | 1.854               | -.599               | .434       | -1.331              | .845       |
| BRV02 | 5.45            | 1.804               | -.733               | .434       | -1.066              | .845       |
| BRV03 | 5.52            | 1.724               | -1.019              | .434       | -.300               | .845       |
| BRV04 | 5.69            | 1.650               | -1.052              | .434       | -.400               | .845       |
| BRV05 | 5.46            | 1.523               | -1.001              | .434       | -.283               | .845       |
| BRV06 | 5.41            | 1.547               | -1.194              | .434       | .087                | .845       |
| BRV07 | 5.00            | 1.890               | -.955               | .434       | -.627               | .845       |
| BRV08 | 5.69            | 1.713               | -1.034              | .434       | -.573               | .845       |
| BRV09 | 5.38            | 1.781               | -1.111              | .434       | .133                | .845       |
| BRV10 | 5.52            | 1.883               | -1.029              | .434       | -.546               | .845       |
| BRV11 | 5.41            | 1.918               | -1.000              | .434       | -.664               | .845       |
| BRV12 | 5.41            | 1.823               | -1.010              | .434       | -.505               | .845       |
| BRV13 | 5.14            | 1.356               | -1.099              | .434       | .445                | .845       |
| BRV14 | 5.41            | 1.803               | -1.224              | .434       | .164                | .845       |

\*\*\* Sample size N = 29 (buyers only)

## PRE-TEST

### Descriptive Statistics (3) \*\*\* (for the variable Relationship Value - Sellers' Perspective)

| Item  | Mean Statistics | Std. Dev Statistics | Skewness Statistics | Std. Error | Kurtosis Statistics | Std. Error |
|-------|-----------------|---------------------|---------------------|------------|---------------------|------------|
| SRV01 | 5.62            | 1.168               | -1.026              | .365       | 1.130               | .717       |
| SRV02 | 5.50            | 1.215               | -.900               | .365       | .601                | .717       |
| SRV03 | 5.33            | 1.588               | -1.273              | .365       | 1.425               | .717       |
| SRV04 | 5.79            | 1.279               | -1.193              | .365       | .976                | .717       |
| SRV05 | 5.45            | 1.400               | -1.156              | .365       | .886                | .717       |
| SRV06 | 5.57            | 1.192               | -1.256              | .365       | 2.143               | .717       |
| SRV07 | 5.69            | 1.239               | -1.954              | .365       | 5.319               | .717       |
| SRV08 | 5.52            | 1.401               | -1.364              | .365       | 2.039               | .717       |
| SRV09 | 5.52            | 1.418               | -1.451              | .365       | 1.999               | .717       |
| SRV10 | 5.48            | 1.469               | -1.526              | .365       | 1.929               | .717       |
| SRV11 | 5.36            | 1.462               | -1.695              | .365       | 2.679               | .717       |
| SRV12 | 5.36            | 1.679               | -1.507              | .365       | 1.531               | .717       |
| SRV13 | 5.48            | 1.383               | -1.341              | .365       | 2.063               | .717       |
| SRV14 | 5.26            | 1.449               | -.937               | .365       | .390                | .717       |
| SRV15 | 5.69            | 1.370               | -1.556              | .365       | 3.007               | .717       |

\*\*\* Sample size N = 42 (sellers only).

## **APPENDIX B**

### **PRE-TEST AND FINAL SURVEY ITEMS**

#### **Study One - For Seller**

1. Our two firms exchange information.....
  - a. on successful and unsuccessful experiences with products exchanged in the relationship.
  - b. related to changes in end-user needs, preferences, and behavior.
  - c. related to changes in market structure, such as mergers, acquisitions, or partnering.
  - d. related to changes in the technology of the focal products.
  - e. as soon as any unexpected problems arise.
  - f. related to changes in the two organizations' strategies and policies.
  - g. that is sensitive for both parties, such as financial performance and company know-how.
2. It is common...
  - a. to establish joint teams to solve operational problems in the relationship.
  - b. to establish joint teams to analyze and discuss strategic issues.
3. The atmosphere in the relationship stimulates productive discussion encompassing a variety of opinions.
4. We have a lot of face-to-face communication in this relationship.
5. We frequently.....
  - a. adjust our common understanding of end-user needs, preferences, and behavior.
  - b. adjust our common understanding of trends in technology related to our business.
  - c. evaluate and, if needed, adjust our routines in order-delivery processes.
  - d. evaluate and, if needed, update the formal contracts in our relationship.
  - e. meet face-to-face in order to refresh the personal network in this relationship.
  - f. evaluate and, if needed, update information about the relationship stored in our electronic databases.
6. Our company's market share is: Stable/Volatile
7. Overall industry sales volume is: Stable/Volatile
8. Sales forecasts are: Accurate/Inaccurate

9. Change in end-user needs and preferences is: Slow/Rapid
10. The nature of competition is: Easy to predict/Difficult to predict
11. Degree of volatility of regulations within the market is: Low/High
12. Degree to which regulations affect profitability : Low/High
13. Degree of government intervention in the industry : Low/High
14. Predictability of the inflation rate in your country : Very unpredictable/Very predictable
15. Currency exchange rate fluctuations in your country : Very unpredictable/very predictable
16. Remittances and repatriation regulations in your country : Very unpredictable/very predictable
17. Overall economic conditions in your country : Very unpredictable/very predictable
18. The resources brought into the transactions by each firm have been very valuable for the other.
19. The resources brought into the transactions by each firm have been significant in getting the job done.
20. Our two firms have separate abilities that, when combined, enable us to achieve goal beyond our individual reach.
21. Between our firm and the customer, we share common goals and objectives.
22. There is a match in our philosophies/approaches to business dealings.
23. We share a similar corporate culture and management styles.
24. We are dependent on one another.
25. It would be difficult for either party to replace the other.
26. It would be costly for either party to lose the other.
27. If this relationship were to end, both firms would waste a lot of knowledge that is tailored to this relationship.

28. If either firm were to switch to a competitive buyer or vendor, they would lose a lot of the investments made in the present relationship.
29. Both firms have invested a great deal in building up their joint business.
30. We believe the customer will respond with understanding in the event of problems.
31. We trust that the customer is able to fulfill contractual agreements.
32. We trust that the customer is competent at what they are doing.
33. There is general agreement in my organization that this customer is trustworthy.
34. There is general agreement in my organization that the contact people in this customer firm are trustworthy.
35. Our relationship with this customer has helped improve our product performance.
36. Our relationship with this customer has helped improve our product reliability and consistency.
37. Our relationship with this customer has helped lower our product return rates.
38. This customer has been able to obtain satisfactory product quality from us.
39. Our relationship with this customer has resulted in more efficient communication between the two parties.
40. Our relationship with this customer has helped improve our problem solving.
41. Our relationship with this customer has helped us better understand each other's goals.
42. Our relationship with this customer has resulted in improved on-time delivery of their orders.
43. Our relationship with this customer has resulted in improved delivery flexibility of their orders.
44. Our relationship with this customer has resulted in improved accuracy of delivery of their orders.
45. Our relationship with this customer has a positive effect on our ability to develop successful new products for our markets.

- 46. Our relationship with this customer has a positive effect on our ability to make improvements to our existing products.
- 47. Our relationship with this customer has helped us remain competitive in our pricing.
- 48. Our relationship with this customer has helped us reduce our costs.
- 49. Our investments of resources in the relationship, such as time, effort and money, have paid off very well.
- 50. Over the lifetime of this relationship:
  - a. Market share for my firm has: greatly declined/greatly improved.
  - b. Market share for this customer has: greatly declined/greatly improved.
  - c. Sales for my firm have: greatly declined/greatly improved.
  - d. Sales for this customer have: greatly declined/greatly improved.
  - e. Return on sales for my firm has: greatly declined/greatly improved.
  - f. Return on sales for this customer has: greatly declined/greatly improved.
  - g. Return on investment for my firm has: greatly declined/greatly improved.
  - h. Return on investment for this customer has: greatly declined/greatly improved.

***Demographic Questions***

- 1. How long has your company done business with this customer?
  - o 1 – 3 years
  - o 3 – 5 years
  - o 5 – 10 years
  - o more than 10 years
- 2. How many years have you personally been dealing with this customer?
  - o 1 – 3 years
  - o 3 – 5 years
  - o 5 – 10 years
  - o more than 10 years
- 3. How much do you know about the relationship with this customer?
  - o No knowledge
  - o very little knowledge
  - o an adequate amount of knowledge
  - o a lot of knowledge

4. What percentage of your firm's annual sales in this product category come from this customer?

- ☐ Less than 10%
- ☐ 10 – 20%
- ☐ 21 – 40%
- ☐ 41 – 60%
- ☐ Greater than 60%

5. What is your firm's approximate total annual sales revenue? (in US\$)

- ☐ Less than \$10 million
- ☐ \$10 – 50 million
- ☐ \$51 – 500 million
- ☐ \$500 million - \$1 billion
- ☐ Greater than \$ 1 billion

6. How long have you been with your present company? \_\_\_\_\_ Years

7. Please provide your job title. \_\_\_\_\_

## Study Two – For Buyer

1. Our two firms exchange information.....
  - a. on successful and unsuccessful experiences with products exchanged in the relationship.
  - b. related to changes in end-user needs, preferences, and behavior.
  - c. related to changes in market structure, such as mergers, acquisitions, or partnering.
  - d. related to changes in the technology of the focal products.
  - e. as soon as any unexpected problems arise.
  - f. related to changes in the two organizations' strategies and policies.
  - g. that is sensitive for both parties, such as financial performance and company know-how.
2. It is common...
  - a. to establish joint teams to solve operational problems in the relationship.
  - b. to establish joint teams to analyze and discuss strategic issues.
3. The atmosphere in the relationship stimulates productive discussion encompassing a variety of opinions.
4. We have a lot of face-to-face communication in this relationship.
5. We frequently.....
  - a. adjust our common understanding of end-user needs, preferences, and behavior.
  - b. adjust our common understanding of trends in technology related to our business.
  - c. evaluate and, if needed, adjust our routines in order-delivery processes.
  - d. evaluate and, if needed, update the formal contracts in our relationship.
  - e. meet face-to-face in order to refresh the personal network in this relationship.
  - f. evaluate and, if needed, update information about the relationship stored in our electronic databases.
6. Our company's market share is: Stable/Volatile
7. Overall industry sales volume is: Stable/Volatile
8. Sales forecasts are: Accurate/Inaccurate
9. Change in end-user needs and preferences is: Slow/Rapid
10. The nature of competition is: Easy to predict/Difficult to predict
11. Degree of volatility of regulations within the market is: Low/High

12. Degree to which regulations affect profitability : Low/High
13. Degree of government intervention in the industry : Low/High
14. Predictability of the inflation rate in your country : Very unpredictable/Very predictable
15. Currency exchange rate fluctuations in your country : Very unpredictable/very predictable
16. Remittances and repatriation regulations in your country : Very unpredictable/very predictable
17. Overall economic conditions in your country : Very unpredictable/very predictable
18. The resources brought into the transactions by each firm have been very valuable for the other.
19. The resources brought into the transactions by each firm have been significant in getting the job done.
20. Our two firms have separate abilities that, when combined, enable us to achieve goal beyond our individual reach.
21. Between our firm and the supplier, we share common goals and objectives.
22. There is a match in our philosophies/approaches to business dealings.
23. We share a similar corporate culture and management styles.
24. We are dependent on one another.
25. It would be difficult for either party to replace the other.
26. It would be costly for either party to lose the other.
27. If this relationship were to end, both firms would waste a lot of knowledge that is tailored to this relationship.
28. If either firm were to switch to a competitive buyer or vendor, they would lose a lot of the investments made in the present relationship.
29. Both firms have invested a great deal in building up their joint business.

30. We believe the supplier will respond with understanding in the event of problems.
31. We trust that the supplier is able to fulfill contractual agreements.
32. We trust that the supplier is competent at what they are doing.
33. There is general agreement in my organization that this supplier is trustworthy.
34. There is general agreement in my organization that the contact people in this supplier firm are trustworthy.
35. Our relationship with this supplier has helped improve their product performance.
36. Our relationship with this supplier has helped improve their product reliability and consistency.
37. Our relationship with this supplier has helped lower product return rates on our orders with them.
38. We have been able to obtain satisfactory product quality from this supplier.
39. Our relationship with this supplier has resulted in more efficient communication between the two parties.
40. Our relationship with this supplier has helped improve our problem solving.
41. Our relationship with this supplier has helped us better understand each other's goals.
42. Our relationship with this supplier has resulted in improved on-time delivery of the orders we placed with them.
43. Our relationship with this supplier has resulted in improved delivery flexibility of the orders we placed with them.
44. Our relationship with this supplier has resulted in improved accuracy of delivery of the orders we placed with them.
45. Our relationship with this supplier has a positive effect on our ability to develop successful new products for our markets.
46. Our relationship with this supplier has a positive effect on our ability to make improvements to our existing products.
47. We have been able to obtain competitive prices from this supplier.

48. Our investments of resources in the relationship, such as time, effort and money, have paid off very well.
49. Over the lifetime of this relationship:
- a. Market share for my firm has: greatly declined/greatly improved.
  - b. Market share for this supplier has: greatly declined/greatly improved.
  - c. Sales for my firm have: greatly declined/greatly improved.
  - d. Sales for this supplier have: greatly declined/greatly improved.
  - e. Return on sales for my firm has: greatly declined/greatly improved.
  - f. Return on sales for this supplier has: greatly declined/greatly improved.
  - g. Return on investment for my firm has: greatly declined/greatly improved.
  - h. Return on investment for this supplier has: greatly declined/greatly improved.

***Demographic Questions***

Business relationships typically evolve through a number of phases over time. Which of the following best describe your firm's business relationship with this supplier? (Check only one)

- |                                          |                                                                                                                          |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <input type="radio"/> <b>Exploration</b> | Started to have some business dealings with each other.                                                                  |
| <input type="radio"/> <b>Maturity</b>    | Enjoying acceptable levels of satisfaction and benefits from this business relationship.                                 |
| <input type="radio"/> <b>Decline</b>     | Considering alternative suppliers or buyers and is beginning to communicate an intent to end this business relationship. |

1. How long has your company done business with this supplier?

- |                                    |                                          |
|------------------------------------|------------------------------------------|
| <input type="radio"/> 1 – 3 years  | <input type="radio"/> 3 – 5 years        |
| <input type="radio"/> 5 – 10 years | <input type="radio"/> more than 10 years |

2. How many years have you personally been dealing with this supplier?

- |                                    |                                          |
|------------------------------------|------------------------------------------|
| <input type="radio"/> 1 – 3 years  | <input type="radio"/> 3 – 5 years        |
| <input type="radio"/> 5 – 10 years | <input type="radio"/> more than 10 years |

3. What is the approximate percentage of purchases that you make from this supplier?
- ☐ Less than 10%
  - ☐ 10 – 20%
  - ☐ 21 – 40%
  - ☐ 41 – 60%
  - ☐ Greater than 60%
4. Check one category that best describes the products that you buy from this supplier:
- ☐ capital equipment
  - ☐ sub assemblies
  - ☐ components
  - ☐ maintenance, repair, and operating supplies
  - ☐ others (please specify) \_\_\_\_\_
5. Check one statement that best describe the type of purchase made from this supplier:
- ☐ routine purchases, restock, replenish
  - ☐ non-routine purchases, meant to solve a particular problem
  - ☐ a mixture of the above
6. What is your firm's approximate annual sales revenue? (in US\$)
- ☐ Less than \$10 million
  - ☐ \$10 – 50 million
  - ☐ \$51 – 500 million
  - ☐ \$500 million - \$1 billion
  - ☐ Greater than \$ 1 billion
7. How long have you been with your present company? \_\_\_\_\_ Years
8. Please provide your job title. \_\_\_\_\_

## APPENDIX C

### CORRELATION MATRIX OF MEASUREMENT SCALES

#### Study One – Seller

|        | EU       | EF       | ORGFIT   | ID       | IV       | TS      | IFKS     | SRV |
|--------|----------|----------|----------|----------|----------|---------|----------|-----|
| EU     | 1        |          |          |          |          |         |          |     |
| EF     | .704(**) | 1        |          |          |          |         |          |     |
| ORGFIT | .680(**) | .742(**) | 1        |          |          |         |          |     |
| ID     | .742(**) | .805(**) | .806(**) | 1        |          |         |          |     |
| IV     | .718(**) | .735(**) | .743(**) | .860(**) | 1        |         |          |     |
| TS     | .206(*)  | .179     | .257(**) | .317(**) | .221(*)  | 1       |          |     |
| IFKS   | .855(**) | .858(**) | .855(**) | .889(**) | .867(**) | .213(*) | 1        |     |
| SRV    | .823(**) | .758(**) | .767(**) | .815(**) | .781(**) | .124    | .902(**) | 1   |

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

#### Study Two – Buyer

|        | EU       | EF       | ORGFIT   | ID       | IV       | TS      | IFKS     | BRV |
|--------|----------|----------|----------|----------|----------|---------|----------|-----|
| EU     | 1        |          |          |          |          |         |          |     |
| EF     | .705(**) | 1        |          |          |          |         |          |     |
| ORGFIT | .685(**) | .744(**) | 1        |          |          |         |          |     |
| ID     | .746(**) | .801(**) | .804(**) | 1        |          |         |          |     |
| IV     | .718(**) | .735(**) | .746(**) | .855(**) | 1        |         |          |     |
| TS     | .206(*)  | .177     | .256(**) | .310(**) | .221(*)  | 1       |          |     |
| IFKS   | .854(**) | .858(**) | .858(**) | .891(**) | .870(**) | .218(*) | 1        |     |
| BRV    | .823(**) | .759(**) | .769(**) | .823(**) | .781(**) | .124    | .904(**) | 1   |

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Note: EU = Environmental Uncertainty, EF = Environmental Fit, ORGFIT = Organizational Fit, ID = Interdependence, IV = Idiosyncratic Investments, TS = Trust, IFKS = Inter-firm Knowledge Sharing, SRV = Relationship Value (Sellers' Perspective), BRV = Relationship Value (Buyers' Perspective)

## **VITA**

Mee-Shew Cheung was born in Singapore. She graduated with a Bachelor of Science degree and a Master of Business Administration degree from Oklahoma City University. In August of 2001, she entered the Doctoral program in the Department of Marketing and Logistics at the University of Tennessee, Knoxville. The doctoral degree was received in August of 2005.

Mee-Shew joined Xavier University in Cincinnati, Ohio, as an Assistant Professor of Marketing in Fall 2005. Her research interests include the role of supply chain management in the development and implementation of global marketing strategy, integrated marketing communication strategy, management of channel adaptation and channel conflicts in a global context.

Before her academic career, she held a senior financial and administrative management position at a consulting firm with regional offices across East Asia.