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Supply Chain Relationships in Procurement: Is Collaboration Reality?

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Table of Contents

Table of Figures

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Abstract

Supply Chain Management (SCM) often requires independent organizations to work together to achieve shared objectives. This collaboration is necessary when coordinated actions benefit the group more than the uncoordinated efforts of individual firms. Collaboration is a key dimension of SCM, and it has numerous key dimensions of its own. These include information sharing, resource sharing, decision synchronization, incentive alignment, goal congruence, joint knowledge creation, and collaborative communication. Trust and commitment are also key factors that intertwine with these dimensions. Successful implementation of these types of collaborative relationships can lead to a collaborative advantage, where firms working together achieve greater success than they would have alone.

Recent research has indicated that collaboration attempts between firms in supply chains have not been as widespread as anticipated. This is despite the commonly reported benefits that may be gained by working together, which may be attributed to traditional business practices where innovation-driving competition between firms is commonplace. A large cause of this might be that academics are far outreaching practitioners with where collaboration should be in its present state of practice.

This research investigates the progress the purchasing function of global organizations has made in achieving collaboration in supply chain relationships, ranging from firms practicing a silo mentality to firms working together to compete with other supply chains. Input is solicited from purchasing professionals with a survey and a series of semi-structured interviews in an effort to present a current snapshot of the utilization

of collaboration in procurement and how supply chains can transition to more collaborative structures in the future.

Results from the data analysis indicate that true collaboration is not yet present in buyer-supplier relationships. Although certain key collaboration initiatives are present, such as information sharing, other critical aspects like trust are not yet widespread. Therefore, firms and supply chains still have room for improvement in order to achieve the close relationships required in order to collaboratively practice supply chain management. Finally, more research is identified to further progress the field and to gain an improved understanding of the complex relationships necessary for true collaboration.

Chapter 1 – Theoretical Grounding and Literature Review

1.1 Introduction - Overview of Supply Chain Management

The Council of Supply Chain Management Professionals (2011), a leading organization for the supply chain profession, defines supply chain management (SCM) as

> The planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.

This definition commences this paper since it blatantly denotes the criticality of collaboration in the field of SCM. Simply stated, SCM represents a way of managing the business and relationships with other members of the supply chain (Lambert et al, 1998). A graphical depiction of the firms and activities in a supply chain can be seen in Figure 1. Supply chains are typically characterized by a forward flow of goods and materials and a backwards flow of information. However, reverse logistics must also be considered since materials often move backwards in the supply chain for recycling, remanufacturing, and reuse (Beamon, 1998).

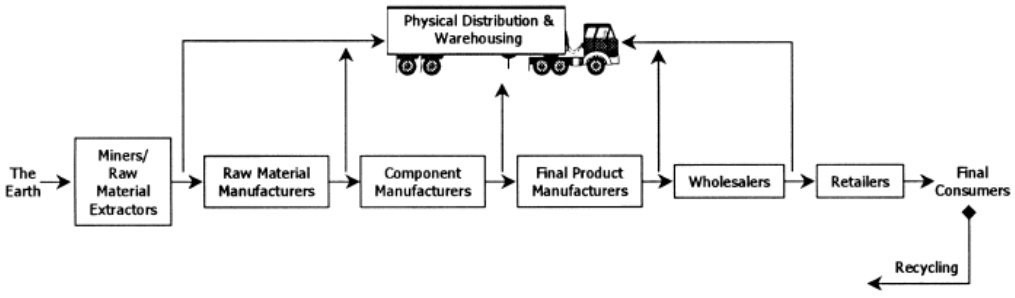

Figure 1 Firms and activities in a supply chain Source: Tan, 2001a; New and Payne, 1995

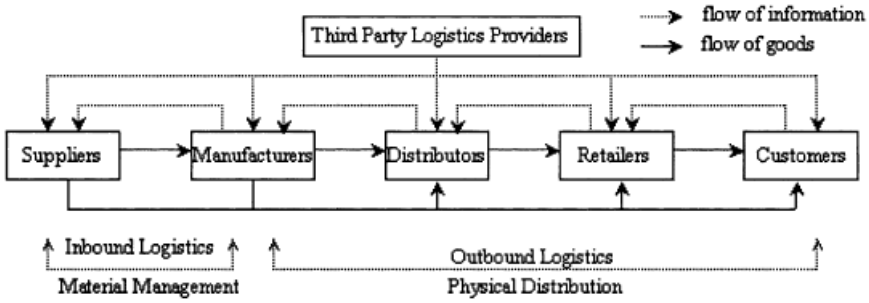

Figure 2 The supply chain process Source: Min and Zhou, 2002

Min and Zhou (2002) note that supply chains are commonly made up of two main business processes, including material management that deals with production planning and inventory control and physical distribution that focuses on logistics processes. They mention that material management deals with inbound logistics, or the acquisition and storage of goods like raw materials or parts. Physical distribution is concerned with outbound logistics interests, such as inventory deployment or order receipt and processing (Min and Zhou, 2002). Finally, they note that a supply chain combines these inbound and outbound activities to allow a supply chain of multiple stakeholders to be successful. Figure 2 shows this supply chain process.

Many firms have reached a point of diminishing returns within their own supply chain practices, so the greatest opportunities for competitive advantage lie outside of their own corporate boundaries (Fisher, 1997). This is consistent with the findings of Wiker et al (1991), who found that the most effective supply chain improvement strategy is to enhance the flow of information at all levels in the supply chain. Not only will this allow firms to better utilize channel partners, but it will also help to avoid the much loathed bullwhip effect, which occurs when variability increases as one progresses

upstream in the supply chain towards the point of origin (Lee et al, 1997). As a result, the idea of supply chain collaboration (SCC) that involves coordination between channel members has developed significantly in recent years and has become an increasingly popular topic in both academic and trade press. This is relevant since all firms participate in the supply chain, from raw material suppliers to the end customer (Lambert and Cooper, 2000). The literature conveys the notion that these members are analogous to teammates competing against other teams. Thus, in the global marketplace, companies do not compete – supply chains do (Christopher, 1997; Lambert et al, 1998; Burgess, 1998; Lummus and Vokurka, 1999; Lambert and Cooper, 2000; Christopher and Juttner, 2000; Duclos et al, 2003; Myers and Cheung, 2008). As a result, it becomes increasingly difficult for firms to compete in isolation of their suppliers or other entities in the supply chain and it may be in their best interest to seek understandings with other firms to work together (Lummus and Vokurka, 1999; Leeuw and Fransoo, 2009). This will require them to remove the silos that separate organizations and coordinate with other firms in the supply chain (Brewer and Speh, 2000). This is supported by Christopher and Towill (2001) when they point out that to be truly competitive requires not just an appropriate manufacturing strategy, but an appropriate supply chain strategy. Mentzer et al (2001) found that this requires that firms have a supply chain orientation, which is when they recognize the benefits of partaking in SCM. They added that firms can only implement SCM after this orientation has been established.

Every company sources globally, sells globally, or competes with someone who does (Mentzer et al, 2006). With higher standards of performance being demanded in the current business environment, companies are looking to their suppliers to help them achieve success (McHugh et al, 2003) since two or more companies working together may be able to achieve greater success than can be attained in isolation (Daugherty et al, 2006). Therefore, collaboration with supply chain partners is critical since this is the driving force of effective SCM (Sahay, 2003a; Sheu et al, 2006). An important step is to recognize that SCM can be used as a competitive weapon to secure and maintain customer loyalty (Burgess, 1998). In addition, channel members have much to gain by working together in an environment of mutual trust and cooperation (Sheu et al, 2006) since misaligned interests can create havoc (Lee, 2004). Not only does this allow firms to share resources, but it helps to reduce a burden since risks, costs, and rewards can be equitably shared between participating firms (Lee, 2004; Soosay et al, 2008). Ballou (2007) may have emphasized the criticality of collaboration the best when he noted that "collaboration among supply chain members is at the heart of supply chain management and will be key to its future success."

Despite the commonly reported benefits of and the increased focus upon the practice of SCM, even firms and supply chains that should be healthy due to great products or resources can stumble when the wrong decisions are made. Fisher (1997) noted that the performance of some supply chains can be impeded when firms and supply chains do not use the right supply chain for their product. More specifically, he noted that innovative products like fashion clothing or electronics need a responsive

supply chain that can adapt to unpredictable demand and functional products like groceries need an efficient supply chain to maximize profits from their minimal profit margins and stable demand. Therefore, a firm with an innovative product that is utilizing an efficient supply chain will likely see inefficiencies develop from the mismatch between the supply chain strategy and product type. This provides evidence that simply utilizing SCM alone is not a guarantee that success will result. Significant planning and resources should be dedicated to this aspect of a firm's business in order to efficiently and effectively manage this critical, boundary spanning function.

1.2 The Supply Chain Management Continuum

Although the previously mentioned CSCMP definition of SCM is now widely accepted, this description has significantly evolved over recent decades as numerous authors have proposed varying definitions as the field has developed (Mentzer et al, 2001). Figure 3 shows the continuum that represents the transition from open market negotiations to collaboration, or in other words from no collaboration to complete collaboration (Spekman et al, 1998). In its infancy SCM involved firms that focused solely on open market negotiations, where each firm in a supply chain operated on its own and sought to increase its own profits with little attention being devoted to channel counterparts (Lancioni, 2000). While many firms have progressed to more advanced stages of collaborative activities, it is not unrealistic to think that some firms still operate in this manner. When a firm engages in open market negotiations, it seeks to leverage the supply chain to achieve the lowest possible prices while assuring supply

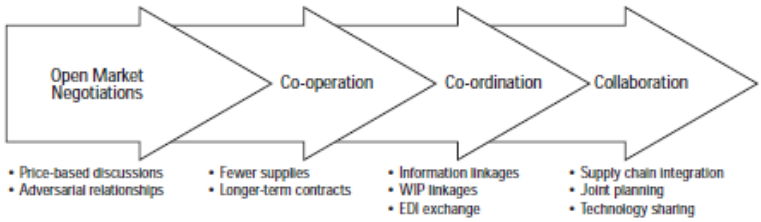

Figure 3 The Supply Chain Management Continuum Source: Spekman et al, 1998

(Spekman et al, 1998). Lancioni (2000) notes that in this situation minimal importance is placed on relationships and little emphasis is given to the customer or other channel members, so relationships tend to be more adversarial in nature. Since competition is fierce and firms possess a silo mentality, information is not shared since that could potentially give a competitor an advantage or put a firm at a disadvantage in a price war.

The second stage in the SCM continuum that Spekman et al (1998) denote is one in which firms cooperate with one another and begin working together for the good of all involved parties rather than individual firms. This stage of SCM became more common in the 1980s as intense global competition led manufacturers to realize the benefits of strategic and cooperative relationships between buyers and suppliers. This cooperative stage involves rationalizing the supplier base by utilizing fewer suppliers and engaging in longer-term contracts. While information is shared with channel partners as needed, a culture of openness and complete trust and commitment still does not exist at this level of SCM.

The third stage involves the coordination of information and activities between firms in a supply chain (Spekman et al, 1998). This involves specific and planned

information linkages, such as electronic data interchange (EDI), that inherently imply that information is shared in a systematic and continual manner. Also present are work-in-process linkages that when paired with information linkages allow for the use of tools like a JIT inventory system. These types of linkages can expose a firm to much risk, so trust and commitment become key attributes to these types of relationships. Lastly, the most advanced stage in the SCM continuum involves true collaboration that can be viewed as the exact opposite of open market negotiations. While the latter sees firms utilizing a self-centered mentality, collaboration indicates that firms are completely committed to the supply chain and its well-being is the ultimate focus. In this stage, firms in a supply chain may be integrated and practices like joint decision-making, technology sharing, and joint planning are common. Thus, while in previous stages the infrastructure exists to enable firms to work together in certain areas, the collaboration stage sees firms operate and make decisions as if they were one entity. A specific example commonly practiced is Collaborative Planning, Forecasting, and Replenishment (CPFR). Adraski (1994) notes that this is a method that facilitates the sharing of marketplace information, such as promotion schedules, POS data, and inventory data, between retailers and suppliers with a goal of creating a customer-centric plan that reduces inventory levels. Some of the benefits of CPFR include issues such as more predictable order cycles, reduced costs, more accurate and timely information, increased customer service and fewer stockouts, and faster inventory turns (Barratt and Oliveira, 2001).

1.3 Theoretical Grounding

Michael Porter's (1985) much referenced thoughts on competitive advantage focus on the premise that a notable goal in business is for a firm to maintain an advantage over its rivals by utilizing lower costs or differentiation. But his thoughts are focused at the firm level rather than the supply chain level, so they are not directly applicable to SCC. However, there have been spillover effects from his research in the supply chain academic literature. Cao and Zhang (2011) note that SCC is not rooted in the paradigm of competitive advantage, but rather that of collaborative advantage (Dyer, 2000). Dyer and Singh (1998) view it in a similar manner, but describe it as a form of relational joint competitive advantage (Cao and Zhang, 2011). Collaborative advantage results when firms are able to manage partnerships and alliances with external companies effectively (Kanter, 1994). This gives firms the ability to view SCC as a tool to maximize the benefit of all parties involved rather than the traditional focus of maximizing the performance of an individual entity. It can also give firms a notable advantage in the current globalized and highly competitive business environment.

With the notion of gaining a collaborative advantage in mind, the literature outlines several perspectives that have been used to classify SCC. Powell (1998) notes that research on SCC has focused on two main themes, including a transactional or exchange oriented focus and a more relational or process-based focus. However, authors like Jap (1999) note a resource-based view as also being critical, and Cao and Zhang (2011) expand upon that by mentioning an extended resource-based view.

1.3.1 Transactional View

The literature often refers to the work of Williamson (1975) when discussing the transactional view of SCC. He proposes two methods of organization that involve market transactions and hierarchy transactions. Market transactions are those that support the coordination of buyers and sellers and involve firms conducting business with those companies that offer the most attractive terms, such as price. Hierarchy transactions support coordination within the firm and include issues like vertical integration. However, this is a rather limiting view when considering SCC since there are limiting factors related to markets and hierarchies and significant monitoring costs can arise from uncertainties like opportunistic behaviors (Kaufman et al, 2000). Therefore, Koh and Venkatraman (1991) note a third method of organization for SCC that helps to avoid these factors. This SCC organization method can limit costs related to opportunistic behaviors and monitoring partners in market transactions (Croom, 2001), and it can also negate the limiting factor of hierarchy transactions since they may not be effective when a firm is forced to internalize an activity that does not match its competencies (Cao and Zhang, 2011).

The transactional view focuses on the exchanges between buyers and sellers in the purchase of a good or service, such as a commodity. These activities are highly dependent on the sharing of information since each party needs to know a transaction is taking place and that funds need to be exchanged (Grieger, 2003). This practice has been aided greatly by information technology (IT), which has helped to support the interorganizational sharing of resources and competencies that help to maintain

network structure, communication, and coordination (Gunasekaran and Ngai, 2004). Thus, IT has played a drastic role in the development of collaborative supply chains and has presented firms with numerous resources they can utilize to make the transactional elements of their relationships flow more smoothly. These include EDI, which is used to transfer point of sale information to the supplier and delivery information to the retailer; vendor-managed inventory (VMI), where a manufacturer takes control of maintaining the inventory of a product it supplies at a customer location; continuous replenishment, which goes beyond VMI and allows suppliers to see stock levels in retailer locations (Barratt and Oliveira, 2001); and radio frequency identification (RFID) tags, which allow for the ubiquitous identification of goods and people.

As of an example of the transactional view in use, consider a manufacturer, distributor, and retailer. If these channel members are utilizing a transactional strategy in their collaborative efforts, their endeavors will include sharing limited information for the purposes of completing transactions and possibly to more effectively manage inventory. But it will be a rather shallow relationship that does not involve more in-depth initiatives like sharing certain resources or joint product development. Nonetheless, it is still an important effort and a potential starting point since these types of communications are a critical aspect of any collaborative relationship. However, a relationship will have to grow significantly beyond this view in order to be truly collaborative.

1.3.2 Resource-Based View

A resource-based view (RBV) begins with a firm gauging key assets, including its own resources, capabilities, and core competencies (Barney, 1991; Japp, 1999). Variability in firm performance in this view can be explained by these key assets, so those firms and supply chains that best utilize their existing assets will be at an advantage (Cao and Zhang, 2011). Porter (1985) noted this resource-based view and how it can lead to a competitive advantage when a firm utilizes its resources and capabilities more effectively than its rivals. While Porter's and other early research on this topic considered both tangible and intangible assets a firm may have within its own boundaries, Dyer and Singh (1998) note that these resources may extend beyond firm boundaries and be a part of interorganizational processes. More specifically, they claim that firms that combine resources in unique and difficult to imitate ways may realize a competitive advantage over other firms that are unable to do the same. Collaboration enables this view by giving firms the opportunities to focus on what they do best and allowing partners to handle the rest, which can also improve the competitive position of a firm or group of firms. An example of this situation is when a firm utilizes a third-party logistics provider (3PL) to handle a portion or all of its logistics activities so that the firm can focus on its own competencies.

Resources can be either tangible goods, such as equipment, or intangible goods like information. While tangible resources are a necessary element to any supply chain, Barratt and Oke (2007) note that intangible resources may have the potential to generate more cash flow than tangible ones. For example, numerous technology firms

have been entangled in patent disputes in recent years relating to smartphones or tablets. Possibly the most obvious example is the litigation between Apple and Samsung, who have been fighting over patents and other issues in court while also being channel partners outside of it. In addition, it is not uncommon for firms to buy the patent portfolio of another firm to further strengthen their own intangible resources, which was recently demonstrated when a consortium of firms, including the likes of Apple, Google, and Amazon.com, purchased the patents of Eastman Kodak Company in its bid to avoid bankruptcy. This is evidence that there is an understanding that these intangible resources that can generate significant amounts of revenue are highly critical to organizational business strategies. While conflict is inherent in any relationship, firms should work together to share resources when applicable since it helps to reduce sources of risk and costs, and rewards can be equitably shared between participating firms (Lee, 2004; Soosay et al, 2008).

Considering again the example of the manufacturer, distributor, and retailer, a strategy based on the resource-based view could entail these firms sharing key assets to create a more effective supply chain. As an equipment example, perhaps the firms discover that they can significantly reduce supply chain costs by sharing vehicles and warehouses. This may be especially fruitful if the firms each offer highly seasonal products that are popular during different times of the year. With this sharing of equipment the firms are able to create a more streamlined and effective supply chain that has the ability to make them more competitive in their respective markets. While transactional elements like information sharing and exchanging funds will be key

ingredients to this arrangement, this sharing of resources takes the firms a step further towards true collaboration by instilling additional bonds between them.

1.3.3 Relational View

Competitive advantage can result as a relationship moves away from the attributes of a market structure and firms focus more on working together. This is clearly relevant to SCC since the strategy requires firms to work closely to achieve mutual goals. The relational view builds upon the resource-based view by expanding the previously mentioned critical resources beyond firm boundaries to create joint profits from working in tandem that are greater than those that could be generated individually (Dyer and Singh, 1998). In these types of boundary-spanning resource situations, channel partners can have complementary access to resources; combine and share unique assets, knowledge, and competencies; engage in knowledge sharing initiatives; and enact governance mechanisms that can all combine to lead to greater success and joint value creation. The key to this view is that the firms involved are able to generate benefits together that they would be unable to generate in isolation (Cao and Zhang, 2011) and long-term profits are based on network relations (Duschek, 2004). Thus, firms have an incentive to work together for mutual benefit in the form of long-term profitability.

Managing relationships is becoming a key factor in competitive positioning as well as a strategic function (Mentzer et al, 2006). An important point is that companies maintain a variety of different relationships and may not be willing or able to develop close relationships with all parties (Christopher and Juttner, 2000). In other words, the

closeness of relationships at different points in the supply chain will vary, with the level of partnership at different links having different levels of involvement since not all links need to be closely integrated and coordinated (Spekman et al, 1998; Lambert and Cooper, 2000). Bovel and Cooper (2000) point out that collaboration may even be beneficial between competitors in non-strategic circumstances, such as the example mentioned previously where Apple and Samsung are both bitter rivals and partners.

Consider the previous example with the manufacturer, distributor, and retailer one last time. This view extends upon the transactional and resource-based views by not only making them share information and potentially resources, but also by establishing mutual goals. This elevates the firms to an entirely new level of collaboration since trust and commitment are becoming increasingly crucial due to the stronger bonds between the firms and dependence upon one another for success. In addition, with shared goals comes a need to consider the supply chain first since the goals of the supply chain match those of each of the participating firms. As a result, any given firm should have no reason to undermine its channel partners since each party's goals are one and the same.

1.4 Conceptual Development - Dimensions of Collaboration

The literature outlines numerous dimensions that serve as enablers to SCC and aid in gaining a collaborative advantage. Using these tools allows independent companies to work together based on shared values and a common goal of doing business to jointly exploit a particular business opportunity (Manthou et al, 2004). They

also present a value adding opportunity by improving innovation, reducing costs and response time, and more effectively leveraging resources (Cao and Zhang, 2011). While there is no shortage of descriptions for these practices and how they can benefit firms and supply chains, what is not clear is whether any or all of these are required to have a successful interorganizational relationship. However, Cao and Zhang (2011) note that these dimensions may be correlated and have causal effects between them. The dimensions of collaboration as outlined by Cao and Zhang (2011) include information sharing (Simaputang and Sridharan, 2004), resource sharing (Sheu et al, 2006), decision synchronization (Stank et al, 2001; Simaputang and Sridharan, 2004), incentive alignment (Manthou et al, 2004; Simaputang and Sridharan, 2004), goal congruence (Angeles and Nath, 2001), joint knowledge creation (Malhotra et al, 2005), and collaborative communication (Cao and Zhang, 2011). While each of these dimensions is crucial to SCM, there exists a significant level of overlap between them. Therefore, for the purposes of this paper many of them will be considered in tandem. In addition, while there are other issues that are critical aspects of SCC, most notably referring to trust and commitment, these types of themes are encompassed within and a significant aspect of the dimensions that will be described below.

1.4.1 Information Sharing, Resource Sharing, and Collaborative Communication

Information sharing is arguably the most commonly referenced dimension of SCC in the literature since shared information forms the backbone of interfirm relationships. It very much enables each of the theoretical constructs mentioned above since it facilitates the exchange of data regarding sales, customer needs, market structures, and

demand levels (Myers and Cheung, 2008). Similar concepts include resource sharing and collaborative communication since all three involve channel partners utilizing various methods to maintain open lines of communication. Since many authors merge resource sharing and information sharing together into one theme (Fawcett et al, 2008), this writing will be no different. Potential benefits of these tools include a reduced incidence of the bullwhip effect, early problem detection, faster response, and trust building (Lee and Whang, 2001). This is a key aspect of SCC because shared information facilitates firms' ability to meet end user needs (Spekman et al, 1998) and free exchanges of information have been found to be very effective in reducing the risks of supplier failure (Lee, 2004). This criticality has not been overlooked in the literature since it has been called the starting point (Simatupang and Sridharan, 2004) or foundation (Lee and Whang, 2001) of collaboration, while Min et al (2005) claim it is an essential ingredient. Much like a relationship between people, Myers and Cheung (2008) posit that information sharing can make or break a supply chain relationship. Not only is this dimension critical to SCC on its own, but it can also enable other dimensions. An example is decision synchronization that is improved by having timely and accurate information from channel partners (Simaputang and Sridharan, 2005).

Although this is clearly a crucial practice for SCM as a whole, information sharing is not without risk. A common fear is that sensitive knowledge that is shared may end up in the hands of competitors. However, despite the fear of information being accessed by unauthorized parties, partners must realize that unless knowledge is shared between parties, the well-being of the entire supply chain may be put at risk since other

competing supply chains will potentially be exploiting the benefits of shared knowledge. Many of the most common causes of supply chain failures can be addressed by increasing knowledge flows between partners and Sahay (2003b) notes that partners may even feel more secure in their relationship when they can openly share sensitive information.

While it clearly has a strong connection with the internet and electronic communication and information sharing in general, resource sharing may also involve physical goods. Harland et al (2004) note that physical assets like plant equipment and facilities may also be shared between independent firms. This can allow firms to hedge against the risk of purchasing or leasing physical goods like equipment or facilities on their own since the risk can be shared between the firms. Companies that allow partners to leverage their resources require high levels of trust and commitment since each party is counting on the other to follow through on its promises of covering its share of issues like leasing or equipment maintenance costs.

While information sharing relates to the interfirm sharing of tactical and strategic data, such as forecasts or inventory information, collaborative communication relates to "the contact and message transmission process among supply chain partners in terms of frequency, direction, mode, and influence strategy" (Cao and Zhang, 2011). It relates to the everyday, informal communications firms are involved with that can include transmission media like e-mail or phone calls. These frequent communications can be convenient and effective methods to solve problems that may arise between channel partners. Collaborative communication is generally a sign that a close

relationship exists and may include balanced and open communications that occur in both directions between the firms (Tuten and Urban, 2001; Goffin et al, 2006).

1.4.2 Decision Synchronization

Decision synchronization is an issue that can greatly reduce a source of conflict inherent in many supply chain relationships. For example, while a supplier will prefer large order quantities so that it can better take advantage of scale economies in production, a retailer will prefer smaller order quantities in order to keep inventory costs low. This dimension of supply chain collaboration is defined by Simaputang and Sridharan (2002) as the degree to which channel partners are able to coordinate critical decisions in planning and operations that benefit the supply chain as a whole. It can relate to issues like forecasting, inventory management, or replenishment. In the example above, the supplier will need to gain an understanding that the retailer cannot order full truckloads of goods while the retailer needs to recognize that it cannot order one item at a time. Holweg et al (2005) provide an additional example of a supplier actually controlling the stock levels of its own products in a retailer location, which as previously mentioned is commonly referred to as VMI. In this case, the decision between the partners has been merged and responsibility given to the supplier. In situations like this it is often the case that the supplier has a degree of risk that prevents it from simply overloading a retailer with its products, such as generous return terms or actual ownership until a customer makes a purchase from a retailer. It has been noted that this dimension impacts information sharing relating to which kinds of information should be shared, but it also has an effect on incentive alignment since different channel

members are responsible for different types of decisions (Simaputang and Sridharan, 2005). Therefore, it provides justification to appropriately devise incentives based on the level of responsibility a party owns.

1.4.3 Incentive Alignment and Goal Congruence

Incentive alignment is a crucial dimension of SCC since an underlying necessity of the strategy is to have common goals and agreed upon rules. This dimension aims to reduce the incidence of a supply chain member from making decisions that are limited to its own benefit. Simaputang and Sridharan (2002) define this dimension as a way to share costs, benefits, and risks across all supply chain partners. They note that this is a good way to improve commitment from supply chain partners, and it can also aid in trust building since firms are working to help each other rather than themselves. Gains and risk should be shared equitably so that they are fair in regards to the level of level of investment and risk a firm is accountable for (Lee and Whang, 2001; Manthou et al, 2004). In other words, they note that a firm with minimal investment should not reap comparable gains as a firm that has a significant investment. These types of agreements, which determine how each channel partner will contribute and gain benefits from the relationship, need to be established early in the process of a collaborative relationship so that unnecessary disagreements can be avoided.

Present day SCM focuses on the premise that all contributors in a value chain benefit (Tan, 2001a). If one firm benefits at the expense of another, then a conflict could arise (Lancioni, 2000) that could negatively impact the well-being of the entire channel. Therefore, the benefit of the entire supply chain must be stressed at all times

(Lancioni, 2000) since companies within it gain from the success of their partners (Lummus and Vokurka, 1999). Ballou (2007) points out an example of how firms can save the entire supply chain money by putting their own interests behind those of the supply chain. His example includes a buyer and a seller who have different optimal order sizes. If the buyer were to dictate an optimal order size, the total supply chain cost would exceed the potential optimal channel cost by almost 25%. To put the interests of the supply chain at the forefront, the buyer will need to make a sacrifice and order more than what is optimal and the seller will need to share some of the cost savings that result from larger order sizes. In the end, all firms in the supply chain benefit from a lower total supply chain cost.

Having risks and rewards aligned makes it much easier for firms to have congruent goals. Goal congruence is defined as "the extent to which firms perceive the possibility of common goal accomplishment" (Eliashberg and Michie, 1984). It refers to the degree to which supply chain partners agree on goals (Angeles and Nath, 2001) and the extent that an individual channel member perceives its own objectives being satisfied by focusing on the supply chain objectives. True goal congruence indicates partners have goals that fully match those of the supply chain or they believe that their individual goals can be achieved by working towards those of the supply chain (Lejeune and Yakova, 2005). This is an area where commitment and trust are at the forefront since it is a key component of the relationship between channel partners and having common goals can help reduce the incidence of opportunistic behaviors (Jap, 2001).

1.4.4 Joint Knowledge Creation

Joint knowledge creation involves the extent to which firms work together to better understand their external environment and the markets they are involved with (Malhotra et al, 2005). This strongly relates to the dimension of information technology and information sharing since creating new knowledge involves processing the information obtained from partners and creating new innovations with it that make the entire supply chain more competitive (Harland et al, 2004). Bhatt and Grover (2004) relate this dimension to organization learning by noting two types of joint knowledge creation activities, including knowledge exploration and knowledge exploitation. Knowledge creation refers to a firm's ability to search for and acquire new and relevant knowledge while knowledge exploitation is assimilating and applying that knowledge for the good of the supply chain. Therefore, supply chains need to be able to work together to find knowledge that they can take advantage of to better compete with the supply chains of competitors.

1.5 Literature Review

The theoretical rooting of collaboration provides an important structure for academics and professionals alike to gain a better understanding of how firms can work together successfully. However, it does little to provide proof that the theory can actually work. Therefore, this section will consider numerous empirical studies in the literature that have considered issues related to supply chain relationships and the benefits of collaboration. This section is an attempt to provide an outline and summary

of these studies, which are summarized in Table 1 in the Appendix. An effort was made to try to include any study that was related to the topic since these types of investigations do not yet appear to be widespread. Thus, the review of the literature below provides coverage on a range of related studies associated with SC relationships and collaboration. In both the summary table and the paragraphs below, the articles are organized in chronological order.

1.5.1 Previous Empirical Collaboration Studies

Kalwani and Narayandas (1995) assess the impact of long-term relationships with specific customers on the performance of supplier firms using data available in the *Compustat* collection of databases and the *Compact Disclosure* database. This database provides information regarding the names of publicly traded firms and the customers they service, as well as the volume of business conducted between customers and firms for the previous seven year period. The authors investigate whether or not tying up with specific customers could have a negative impact on the performance of a supplier firm. Results indicate that maintaining long-term relationships with select customers does not come at the expense of sales growth. Suppliers in long-term relationships are able to achieve the same growth rate as firms that do not specialize with few customers. Additionally, efficiency is improved as these suppliers are able to reduce costs over time with better inventory utilization and they achieve higher profitability by reducing discretionary costs when compared to firms that service many customers.

Spekman et al (1998) examine SCM as it applies to developing and maintaining a competitive advantage for a given firm. A key objective of the study was to determine

how to develop and sustain collaborative relationships. Using a questionnaire that was completed by 22 aggregate supply chains from North America, South America, and Europe, the authors investigate a wide range of SCM processes and practices as they were reported by these companies. By considering the views of both buyers and sellers, the study adds a holistic perspective that previous studies do not possess since they typically consider only the view of the buyer or the seller. Findings are quite revealing since they determine that there is a difference between what managers say and what they do. That is, evidence suggests that the importance of customer relationships is not overlooked, but actions show more of an emphasis on gain at the company level rather than the supply chain level. What the organizations report is that both customers and suppliers are viewed as important supply chain partners whose participation and input are important. They also seek to find partners who are trustworthy, have integrity, and know the business. However, it is found that information is typically only shared when absolutely necessary and some may seek economic gain at the expense of a partner. In addition, buyers are less likely to embrace collaboration and appear to fear the close ties required for integrated SCM. The underlying theme from these results is that business has not yet fully put into practice the concept of SCM.

Using case studies involving 80 in-depth interviews in 11 companies and 5 supply chains, Lambert et al (1998) illustrate a wide range of supply chain concepts by utilizing a framework for understanding SCM suggested by Cooper et al (1997). The former authors aim to address some of the research questions posed by the latter authors in creating their framework, as well as to add substance to the framework. The

exploratory findings of the work indicate that managing a supply chain involves three related elements, which include the network structure, business processes, and the management components of the supply chain. The results also suggest that the structure of activities between companies is vital for creating superior competitiveness and profitability, and that successful SCM requires integrating business processes with key members of the supply chain. An important point is that many resources are wasted when supply chains are not integrated and appropriately managed. The authors hope this paper will lead to greater successes for practitioners and academics in understanding and implementing SCM. Lambert and Cooper (2000) undertook a similar study that examines the level of integration that is required to lead to successful SCM results. Conclusions are consistent with the previous work by Lambert et al (1998).

Christopher and Juttner (2000) describe practices in several industries in regards to managing supply chain relationships. In order to gain insights into the experiences of practitioners, the authors utilize 12 focus group interviews of senior supply chain professionals at a major logistics conference, as well as six case studies that explored the issues identified in the focus group interviews in more depth. The goal is to help guide managers in their attempt to develop strategic partnerships in the supply chain. The resulting framework has six elements, including defining a balanced set of relationships, developing the right interface structure, cooperating across systems, managing people through change, monitoring the relationship, and managing the relationships. The authors hope gathering what practitioners actually do and disseminating that knowledge will help in the application and development of supply

chain relationships and help to advance the state-of-practice of SCM. However, rather than attempt to set a firm foundation of theory for managing supply chain relationships, they seek to simply disseminate knowledge so that it can be applied and the field further developed.

Fawcett and Magnan (2002) investigate how SCM is actually practiced by gaining input from industry managers using a multi-method approach utilizing a survey and case studies. The two core issues they investigate include whether definitions of SCM vary across functional areas and whether definitions of SCM vary by channel position. Although their survey response rate was meagerly below 10%, they were able to draw conclusions from that and the 52 interviews they conducted with firms at different levels of the supply chain. While the literature indicates that SCM involves advanced information flows and healthy relationships between channel partners, they note that experience indicates few companies are actually engaged in SCM to that extent. Findings of their empirical study are consistent with this assertion since they show that SC practices are rarely consistent with the theoretical ideal. In addition, their identification of three levels of SCM implementation indicates that tension exists between the potential of SCM and the difficulty of implementing collaboration. They also conclude from their research questions that managers from different functional areas and different channel positions do in fact have unique definitions of SCM. Finally, it is noted that while collaboration does exist to a certain degree, it is usually only with a focal firm's immediate upstream and downstream partners.

Whipple and Russell (2002) conduct a qualitative study by utilizing in-depth interviews to examine collaborative relationships. Using a Grounded Theory Approach from insights gleaned in 21 interviews of managers from ten different manufacturers and retailers involved in SCM and a literature review, they propose a typology of collaborative approaches that are compared and contrasted. The three approaches they develop based on input from the exploratory interviews include collaborative transaction management, collaborative event management, and collaborative process management. These approaches build upon each other, where collaborative transaction management involves high volume data exchange and task alignment at an operational level, collaborative event management adds to that by incorporating decision making at the managerial level, and collaborative process management extends it even further by being more of a strategic collaboration that includes knowledge sharing and joint decision making. The hope of the authors is that managers can use this typology in order to assess and improve their current collaborative relationships, as well as to aid in developing new relationships. It is notable to mention that the authors posit that different relationships may have different needs and thus may call for different approaches as outlined above. More specifically, while it may be appropriate to have an immersive relationship with one firm, another may require more of an arm's length relationship.

Childerhouse and Towill (2003) demonstrate the route to a fully integrated, effective supply chain has long been established, albeit under different names or titles, by statistically analyzing 32 industrial case studies. These studies include numerous

European automotive system and component suppliers and a utilities organization from the United Kingdom. During their review the authors process map material and information flows for the companies, interview key managers, evaluate historical company information, and solicit responses to questionnaires. This results in an in-depth understanding of the value stream that they are able to fully document. Findings indicate that the key to an integrated supply chain is simplified material flow, although this concept has been marketed under numerous different terms. In addition, the effectiveness of a supply chain can be measured by assessing the level of uncertainty for the four segments of supply, process, demand, and control. To simplify material flow, they design 12 rules that if conformed to will reduce uncertainty and lead to increased supply chain integration. These twelve rules are designed as a complete set of guidelines for practitioners to simplify their material flows. Additional findings include that the level of uncertainty in a supply chain can be determined from a set of dynamic, organizational, situational, and process behavior observations. Finally, the authors point out that companies that applied the previously mentioned twelve rules to their operations reduced uncertainties in their supply chains and gained an improved level of performance.

The level of involvement of customers and suppliers across different supply chain processes and sectors is explored by Sahay (2003a). The author bases his research on feedback received from 160 organizations spread across India. Rather than viewing supply chain collaboration at a macro level, it is broken down into twelve different processes and respondents are asked to indicate the involvement of customers and

suppliers in different processes. Analysis of the data indicates that the degree of involvement with collaboration varies across different processes and business sectors. One issue is that processes that are important to suppliers are not necessarily important to customers, so the two groups will have to work together to find a level ground. Another key finding that causes concern for the author is that both customers and suppliers have poor involvement in warehouse management. Effectively participating in this area will allow firms to select locations more successfully and potentially share space with channel partners. Sahay finds that higher involvement of the customer is necessary for effective management of demand variability, but that suppliers must also be aware of the variability in order for the entire supply chain to be more adept at responding to changes. The author concludes that involvement between channel partners must reflect a cooperative spirit to reap the benefits of close working relationships.

Gunasekaran et al (2004) combine previous literature with a survey that was sent to 150 large companies in the UK to create a framework to promote a greater understanding of the relevance of SCM performance measurement and metrics. The survey was broken into four parts to match the four basic processes in a supply chain, including plan, source, make, and deliver. Although the response rate of their empirical study is a dismal 14% with 21 of 150 surveys returned completed, the authors find it sufficient to develop the framework. In addition to helping create the framework, survey results show that firms reported a higher return on investment after participating in contemporary SCM practices, which implies that a proactive approach to

SCM can lead to financial benefits. It is also reported that SCM has a positive impact on market share. While participating in SCM is beneficial to firms, the authors point out it must be done well to lead to positive results. This is why performance measurement and metrics are of vital importance since they will gauge how well a company or supply chain is operating.

Simatupang and Sridharan (2004) use a survey to conduct a benchmarking study that measures the level of collaborative practices and how that impacts operational performance between retailers and suppliers. The main dimensions of collaboration as identified by the authors are utilized to compare differences in the use of collaboration, including information sharing, incentive alignment, and decision synchronization. Information sharing is defined as the extent to which channel partners share private information over time; incentive alignment as the degree to which partners share costs, risks, and benefits of collaboration; and decision synchronization as the degree to which members engage in joint decision making at the planning and operational levels. The survey sample was drawn from several trade databases, such as *The New England Business Directory,* and 76 surveys were returned out of 367 representative sample possibilities for a return rate of 21%. Since the authors wanted to gain insights from both retailers and suppliers, two versions of the survey were created in order to account for each. Findings indicate that firms engage in collaboration for a wide range of reasons, including examples such as increased sales, reduced inventory, and better forecasting. In addition, they find that supply chains can see higher levels of performance based on the level of collaborative practice they undertake. This leads to

several categories of collaboration ranging from full utilization of the strategy to essentially downplaying its benefits, including synergistic collaboration, efficient collaboration, prospective collaboration, and underrating collaboration. This comparison of collaborative practices between high and low performers leads the authors to conclude that those who achieve a high level of collaboration are also able to achieve higher levels of performance.

Sheu et al (2006) develop a supplier-retailer relationship model by collecting data from structured interviews in a field setting. They study five pairs of suppliers and retailers in Taiwan for the case study research, with each pair serving as a unit of analysis. For each unit, the authors collect data relating to eight relationship variables that are critical to collaboration. They consider this to be a groundbreaking study since the eight variables cover an array of fields, whereas previous research was fragmented with a few variables being studied within a given field. Thus, the model recognizes several economic, social, and technical variables that are found to be relevant to relationships external to a given organization based on previous studies. Results show that management commitment for resource investment in long-term relationships is influenced by the supplier-retailer business relationship, including factors like interdependence, intensity, and trust. In addition, this relationship also affects supply chain architecture, which involves information sharing, inventory systems, IT capabilities, and coordination structure. This architecture is positively impacted by a long-term orientation by partners. It also affects the level of collaboration since it provides a more effective platform for parties to work together. Having considered all

of these factors, the authors conclude that collaboration enhances performance between channel partners.

Myers and Cheung (2008) undertake research to better understand and facilitate better sharing of global supply chain knowledge. Over a two year period, five partner companies of the University of Tennessee and over 100 of their overseas suppliers are interviewed to understand their exchange context, the nature of their tasks, and the relevance of the measures to their industrial experience. These measures were identified as critical from a review of the existing literature. The authors then test the effect of knowledge sharing on company performance by utilizing a Web survey with data from 264 respondents. Results indicate that knowledge sharing is critical for supply chains to benefit as a whole. In addition, benefits may not always be equally shared, disproportionate benefits between partners may lead to tension that needs to be addressed, and cross cultural differences rarely matter in the context of knowledge sharing value. To sum up their research, the authors point out that knowledge sharing has never been more critical than it is in the competitive environment of present-day global supply chains.

Leeuw and Fransoo (2009) perform exploratory research utilizing previous literature and case studies to determine the drivers of close supply chain collaboration in the electronics, fashion, and consumer packaged goods industries. They develop a multi-variable conceptual model relating to factors influencing the need for close supply chain collaboration. They also note that their work is the first in-depth study of collaboration from both an analytical and empirical point of view. Their research

suggests that multiple factors influence close supply chain collaboration, such as the criticality of the product or service or capabilities of suppliers. The authors also determine that close supply chain efforts are more often than not aimed towards suppliers rather than customers. They arrive at the conclusion that this is because it is less complex to start initiatives with upstream suppliers than it is with downstream customers. Lastly, it is determined that close supply chain collaboration can actually lead to apathy in a supply chain relationship where each party waits on its channel partner(s) to make improvement efforts, which leads to nothing happening. This provides evidence that there could be diminishing returns to integration investments in supply chains (Das et al, 2006).

Fawcett et al (2012) utilize structured interviews to gain insights into how firms use collaborative initiatives and "explain the motives, enablers, and resistors to a successful collaborative strategy." They develop several propositions relating to how the strategy is applied by firms. Findings indicate that pressure to lower prices, which can initially deter collaboration efforts, may actually aid them as traditional cost-cutting measures become less viable and managers seek close relationships to achieve the outcome. A similar pressure exists to serve customers, and managers may seek collaborative relationships to achieve service levels that cannot be met while working alone. While boundary spanning relationships may lead to better cost and customer outcomes, they note that traditional organizational structures and cultures are inhibitors to collaboration. However, managerial commitment and investing in collaborative enablers may help to overcome these difficulties. Finally, having the

capability of working with other firms to achieve greater success should lead to performance benefits, and this should help improve the commitment to future collaborative efforts.

Finally, the influence of collaborative factors on the success of collaboration in supply chains is investigated by Ramanathan and Gunasekaran (2014) by using a survey of customers of a textile company. They use structural equation modeling to investigate the relationships of collaborative planning, collaborative decision making, and collaborative execution on the success of collaboration and future collaboration. Results confirm that the factors do impact the success of collaboration, and that this may be a factor that leads firms to continue their engagement in successful relationships.

1.5.2 Conclusions

Collaboration is an issue that has been thoroughly covered in the literature in terms of theory. However, while collaboration has been a popular topic in recent years that has received much attention, there has not yet been an overabundance of empirical studies in the academic literature investigating the matter. However, a range of inquiries have been made into supply chain relationships and how collaboration can improve firm and supply chain outcomes and the results of these studies are promising. Since these studies have touched upon a broad range of SC relationship and collaboration issues, this review is open to any related study that relates to the topic at hand. As previously mentioned, these studies are summarized in the Appendix.

The results of the research provide much evidence that close relationships and collaboration are desirable traits for supply chains to strive for, especially since they often have positive impacts on revenue and sales growth. However, while it is commonly accepted that firms should work in concert to achieve mutual goals, many firms still practice traditional methods of focusing all or mainly upon their own well-being rather than that of their supply chain. Some companies may still take advantage of opportunistic behaviors that provide them with gains while hindering the supply chain as a whole. Thus, the concept of SCM has not yet been fully accepted and put into practice. In addition, while these studies make it clear that the practice of collaboration has much potential, others note that gains from collaborative initiatives are often disappointing (Fawcett et al, 2012). Therefore, bridging the gap between potential and reality will need to be a key for firms and academics alike to focus on in the future.

A key problem pointed out by the literature is the intense nature of relationships between external firms that is required for collaboration to be successful. Sensitive information often needs to be shared in order to improve the supply chain as a whole. Processes and information technology systems may also need to be integrated and risks and benefits shared between firms, so a culture of trust and mutual interdependence needs to be present and traditional combative business practices must be put aside. This can lead to a more efficient and effective supply chain that wastes fewer resources and ultimately becomes more competitive. However, firms must agree on which processes are critical to integrate and channel partners need to be proactive in order to avoid the diminishing returns that often result from partners waiting on each other to

make improvement efforts, which results in a situation where nothing happens at all. Finally, each firm must be fully committed to the well-being of the supply chain or risk failure for every company involved.

Chapter 2 – Hypothesis Development and Methodology

Previous literature has provided evidence that some degree of collaboration is desirable for all parties within a given supply chain. Collaboration will permit a more synchronized value chain with greater visibility and traceability. It will not only lead to improved profitability, but it will also lead to better service for the end customer. The research question to be considered in this paper is whether or not the purchasing function actually collaborates with suppliers, or as Mentzer et al (2001) stated it, how prevalent is supply chain management? More specifically, do buyers at companies in a supply chain become involved in immersive relationships with channel partners that are full of trust and knowledge sharing, or are relationships still combative where each firm is solely interested in its own well-being? While firms have likely found a middle ground between their own success and that of the supply chain, outlining the current state of collaboration can provide a glimpse into how relationships have developed and how they need to continue to improve. Managers have long acknowledged the importance of establishing close relationships among firms (Spekman et al, 1998), but do they act on their own advice and create the relationships? This is a critical problem since relations between U.S. manufacturers and their suppliers were reportedly at their lowest levels in decades in the mid-2000s (Liker and Choi, 2006). Another goal of this research is to identify reasons why collaboration has seemingly experienced a delay in becoming common practice, which numerous studies outlined above indicate is a requirement for SCM to reach its full potential. The data collected in this research should provide evidence for areas of weakness in current collaborative efforts between buyers and

suppliers, which may lead to prescriptive suggestions about how these groups can improve their collaborative relationships. Finally, this research will provide a snapshot of how purchasing managers view collaboration in the present day, which will serve as a gauge for how the strategy has progressed in recent years.

2.1 Hypothesis Development

The literature in recent years has noted that collaboration is the ultimate goal of SCM since the greatest opportunities for competitive advantage lie outside the boundaries of a given firm (Fisher, 1997) and since it has been stated that firms can no longer compete in isolation of their suppliers or other entities in the supply chain and they must work together in order to achieve success (Lummus and Vokurka, 1999; Leeuw and Fransoo, 2009). However, numerous issues have hindered the field's progress and it has had a disappointing track record due to issues like an overreliance on technology, the previously mentioned lack of trust between partners, and numerous firms' failure to differentiate their most profitable customers (Fontanella and Sabath, 2002). While some firms have adapted their strategies to take the benefit of the entire supply chain into consideration, others are still apprehensive about developing close relationships and having high levels of transparency with channel partners. As previously noted, this is due to reasons like a fear of external firms taking advantage of opportunistic behaviors or simply because a firm wants to optimize its own processes and profits in the traditional manner. While collaboration may not be the norm, the benefits of progressing beyond traditional adversarial relationships are now widely

known. Therefore, the hypotheses 1a and 1b address the progress the field of SCM has made towards collaboration with the SCM continuum serving as a frame of reference.

H1a: A majority of firms will have progressed beyond traditional, price-based relationships as outlined by Spekman et al (1998).

H1b: A majority of firms will not yet have achieved collaborative relationships as outlined by Spekman et al (1998).

Not only is participation in collaborative relationships important by itself, but the degree to which firms are working together is also of interest. Do firms simply exchange the required information in order to conduct business or are they sharing resources and developing close, long-term relationships with the goal of improving the supply chain in mind? The previously discussed dimensions of collaboration provide insights into these different levels of depth in collaborative relationships. Therefore, hypotheses 2a through 2e address the issue of the intensity of supply chain relationships in the current environment.

H2a: Firms will be involved in the collaborative communication dimension of collaboration more than information sharing.

H2b: Firms will be involved in the collaborative communication dimension of collaboration more than decision synchronization.

H2c: Firms will be involved in the collaborative communication dimension of collaboration more than incentive alignment.

H2d: Firms will be involved in the information sharing dimension of collaboration more than decision synchronization.

H2e: Firms will be involved in the information sharing dimension of collaboration more than incentive alignment.

The literature places much importance on these dimensions and their contribution to collaboration. Thus, it would seem that each should have a positive relationship with collaboration and lead to better relationships between firms. Hypotheses H3a through H3d address this by positing these relationships.

H3a: Information sharing is positively related to collaboration.

H3b: Decision synchronization is positively related to collaboration.

H3c: Incentive alignment is positively related to collaboration.

H3d: Collaborative communication is positively related to collaboration.

It has already been noted based on previous research that firms participating in collaboration have a great opportunity to be more efficient (Kalwani and Narayandas, 1995), more customer focused by exchanging information about customer needs (Myers and Cheung, 2008), and more successful overall than those not participating (Kalwani and Narayandas, 1995; Simatupang and Sridharan, 2004). It can lead to benefits like greater visibility, reduced variability, and increased velocity in the supply chain, which greatly reduces the likelihood that problems like the bullwhip effect will arise and leads to a level of competence that can make one supply chain dominant over its competitors. Therefore, firms should report that participation in collaborative relationships or practicing certain collaborative initiatives have led to numerous benefits and overall firm and supply chain performance should be improved by utilizing these strategies.

H4: Firms that report higher levels of collaboration with their channel partners will also report higher levels of performance from their collaborative relationships.

It has already been noted that trust is a key element in a collaborative relationship. When firms are working closely together and sharing potentially sensitive information, they need to have the confidence that their partner will not take advantage of opportunistic behaviors. Firms must also understand that they have the responsibility to be mindful that the knowledge they gain from partners is private and

Hypothesis	Details
1a	*A majority of firms will have progressed beyond traditional, price-based relationships as outlined by Spekman et al (1998).*
1b	*A majority of firms will not yet have achieved collaborative relationships as outlined by Spekman et al (1998).*
2a	*Firms will be involved in the collaborative communication dimension of collaboration more than information sharing.*
2b	*Firms will be involved in the collaborative communication dimension of collaboration more than decision synchronization.*
2c	*Firms will be involved in the collaborative communication dimension of collaboration more than incentive alignment.*
2d	*Firms will be involved in the information sharing dimension of collaboration more than decision synchronization.*
2e	*Firms will be involved in the information sharing dimension of collaboration more than incentive alignment.*
3a	*Information sharing is positively related to collaboration.*
3b	*Decision synchronization is positively related to collaboration.*
3c	*Incentive alignment is positively related to collaboration.*
3d	*Collaborative communication is positively related to collaboration.*
4	*Firms that report higher levels of collaboration with their channel partners will also report higher levels of performance from their collaborative relationships.*
5	*Firms that report higher levels of trust with their channel partners will also report higher levels of performance from their collaborative relationships.*

Figure 4 Summary of hypotheses

not to be shared. With that in mind, hypothesis 5 investigates trust and how it can be an indicator of performance improvements.

H5: Firms that report higher levels of trust with their channel partners will also report higher levels of performance from their collaborative relationships.

Based on the hypotheses above, a conceptual model of the relationship between collaboration practices and improved firm performance is described in Figure 5. Since the literature review presents evidence that fully immersive collaborative partnerships are rare, this figure posits that implementing even a degree of collaboration in supply chain relationships should lead to improved performance. Thus, while firms in a supply chain may not practice business as a single entity in the true spirit of collaboration, they may still gain an advantage from participating in collaborative practices like sharing forecasts or including partners in the product design process. The framework also takes

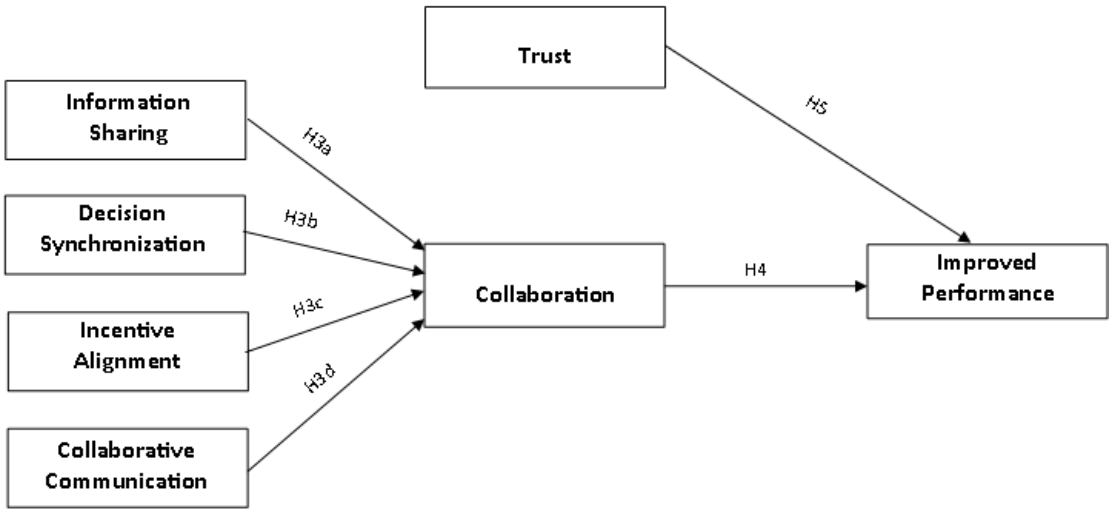

Figure 5 Collaboration research framework

into account the dimensions of collaboration that firms can adopt to further their advancement towards the practice of SCM, which also enhance collaboration practices and ultimately can improve performance.

2.2 Research Methods

Multiple methods will be utilized in this study to investigate relationships and collaboration since research has indicated that using multiple methods is desirable when undertaking new investigations. Mingers (2003) promotes the use of both hard and soft approaches to a research problem, and others have made it evident that utilizing both qualitative and quantitative methods and triangulation lead to higher quality research and greater insights to problems since the majority of logistics research has evidently historically been more quantitatively focused (Gioia and Pitre, 1990; Yaunch and Steudel, 2003; Mangan et al, 2004). Therefore, this study will exploit methodological triangulation by utilizing a review of the literature, as well as both quantitative survey analysis and qualitative interviews of supply chain professionals in order to achieve more reliable results. It may also provide more multidimensional insights into the problem at hand (Mangan et al, 2004). In what is commonly looked upon as a classical argument, Becker and Greer (1957) argue that observation is the best research method while Trow (1957) claims interviewing is superior. Thus, to gain a more extensive understanding of collaboration this research will involve both methods. Golicic et al (2002) also note that previous literature is a factor to consider in

triangulation. Therefore, this research utilizes all three data sources in order to provide evidence to support the theories that emerge.

The St. Louis and Kansas City CSCMP Roundtables will be approached as resources to aid in collecting information for this study. Since numerous types of firms are involved with the CSCMP, this will be beneficial for the research to avoid targeting a single type of firm, such as a manufacturer. It will also aid the research since SCM is relevant to multiple types of firms and industries (Min and Mentzer, 2004). The American Purchasing Society will also be utilized in the research in order to supplement the data collection process.

Previous literature on collaboration has varied in its focus on specific members of a supply chain or specific representatives within each particular firm. While there have been studies that consider both buyer firms and supplier firms in order to gain a more holistic view, it is not always clear whether differences of opinion exist between representatives within a single firm. It has been shown that there will certainly be conflicting perspectives of collaboration among different firms. It may also be likely that representatives from a single firm, especially those that deal with different parts of the supply chain, may have different opinions of collaboration and how their firm is involved with it. Therefore, a key to this research is the focus on the upstream portion of the supply chain. Spekman et al (1998) demonstrate that purchasing managers have a critical role to play as their organizations transition through the SCM continuum. Rather than simply managing transactions, deeper involvement with SCM sees the procurement manager become more of a broker of information with much higher

involvement throughout the supply chain. Thus, this person is responsible for guiding both the formation and execution of long-term relationships and supply chains composed of numerous individual firms (Spekman et al, 1998). With this critical role in mind, the semi-structured interviews and internet survey will be conducted by only utilizing purchasing representatives of respondent firms. This will allow for a consistent perspective throughout the results and help to avoid the issue of contrasting opinions of collaboration between respondents involved with different parts of the supply chain, such as purchasing managers and sales managers.

2.2.1 Semi-structured Interviews

The first part of the study involves in-depth qualitative analysis with semi-structured interviews of industry professionals. Interview questions center on the previously noted SCM continuum (Spekman et al, 1998) in order to attempt to gain an understanding of how firms have progressed towards collaboration. The interviews will seek to understand the experiences of respondents and the lessons they learn from their experiences (Seidman, 1998). There will be an interview guide (see Appendix) used in an effort to extract the desired information from the interviews, but interviewees will be allowed to discuss whatever they deem to be important related to the issue at hand. This method allows for more freedom in responses rather than being framed into predetermined survey questions, which could provide critical insights about collaboration in the present environment. It also helps to provide context to the survey findings (Fawcett and Magnan, 2002) and may provide insights unique to those of the survey since respondents have a tendency to provide different answers depending on

the mode of questioning (Dillman, 2000). As previously mentioned, the results will be practical since they receive input from a variety of organizations in the supply chain, including but not limited to manufacturing, transportation, or government entities.

Interviewing allows the supply chain relationships the interviewee is involved with to be understood more thoroughly and put into context. It also aids in the understanding of why these activities are undertaken in the first place (Seidman, 1998). Perhaps they are required by a dominant channel partner, they have experienced the benefits commonly believed to be gained from it, or it is even conceivable to consider the possibility that firms are partaking in collaboration and close relationships simply because they heard they were supposed to. These are the types of conclusions the interviewing portion of this research seeks to investigate on a more personal level, where respondents have the freedom to say anything they want rather than being limited to a list of options like they are when taking a survey. The results of the interviews will also be used to edit and supplement the internet survey since new topics may arise that need further investigation.

2.2.2 Internet Survey

To further expand this research beyond the semi-structured interviews, the second part of the methodology of this paper solicits input from professionals in the purchasing function of their firms via a survey instrument. This survey instrument has been largely developed by reviewing previous literature. The previously completed interviews will present the opportunity to modify or add to the survey questions, as needed. The rationale of this survey is to acquire enough information to be able to

successfully generalize the findings (Pinsonneault and Kraemer, 1993). Since collaboration and transparency will be a driving force for the next level of supply chain optimization (The Consumer Goods Forum), it is valuable to know what degree of collaboration firms and supply chains actually practice. This questionnaire is comprised of numerous questions that gauge respondents' opinions of their firm's utilization of collaboration and is centered on the previously discussed dimensions of collaboration. Specifically, it focuses on three dimensions that were identified as critical by Simaputang and Sridharan (2005): information sharing, decision synchronization, and incentive alignment. The full survey can be seen in the Appendix.

Churchill's (1979) framework for construct development is followed in the search for and subsequent development of questions. This involves utilizing existing measures whenever possible and providing rationale for the development of new constructs. The goal of the search for questions was to find items that related to the theoretical constructs previously discussed, including the transactional, resource-based, and relational perspectives on relationships. This will help to provide insights on how firms utilize these strategies and whether or not true collaboration exists, which as Spekman et al (1998) note includes activities like joint planning, integrated supply chains, and technology sharing. Every firm should participate in the transactional strategy to some degree since some sort of communication is required. However, it will be of interest to see to what extent that strategy is utilized and whether or not the resource-based and relational strategies are also exploited. Lastly, a notable attribute to survey research in the Churchill (1979) framework is to capture the domain as specified. This research

accomplishes this facet since not only was a thorough literature review completed in order to utilize existing measures, but the survey is also reviewed and critiqued by academics and professionals in the field. These reviewers are able to help to ensure wording is precise and understandable in order to avoid situations where results can be impacted by alternative interpretations.

The foundations of the survey are based on Dillman's (2000) Tailored Design perspective, which builds questions on the pillars of creating trust that long-term rewards will outweigh the cost, increasing rewards one expects to gain from a particular activity, and reducing costs that one gives up or spends to obtain rewards. The method has a main goal of reducing several types of error in the survey, including sampling, coverage, measurement, and nonresponse, and it focuses on social exchange theory. Blau (1964) notes that this theory affirms that actions of individuals are motivated by what kind of returns can be expected from others. An important note is that this theory differs from and is much broader than economic exchange in that money is not always the measure used to determine the worth of actions (Dillman, 2000). Evidence is provided to this fact by James and Bolstein (1992), who find that while cash incentives to complete a questionnaire do improve response rates, promises to pay people after a survey has been completed do not. Thus, social exchange is a subtle method to influence response behavior when rewards that can be offered to respondents are small (Dillman, 2000).

Respondents will be highly encouraged to fully complete the survey since line items with missing responses will be deleted. The survey used for this research utilizes

numerous methods to improve response rates presented by Dillman (2000), who summarizes ways that a researcher can attempt to have an effect on the reward, cost, and trust factors of a survey. While tangible rewards are an obvious incentive that will not be utilized in this study, respondents can feel rewarded by something as simple as being regarded in a positive manner (Thibaut and Kelley, 1959) or being shown appreciation for their efforts. They may also feel a sense of reward when they sense that they are providing assistance or advice with their efforts. Finally, informing respondents that other people like them have already participated may lead to a feeling of wanting to be involved for social validation. These types of small, negligible efforts can have a notable impact and will be utilized in this research.

Factors related to reducing social costs are the second method outlined by Dillman (2000) to improve the likelihood of achieving a high response rate and are in essence the opposite of increasing rewards. Blau (1964) contended that respondents do not like to be subordinated and will often not respond if they feel like they are being treated in such a way. Thus, rather than making light of the role played by respondents, it is emphasized in the survey that assistance is much appreciated and they are doing a favor by participating. Second, while participating in a survey may automatically be considered to be a nuisance, conducting the survey in an easily accessible format online may help to avoid inconvenience. Lastly, it is recommended to make surveys appear short and easy, so the survey instructions will provide an optimistic yet realistic estimate of how long it should take to respond.

The final factor outlined in Dillman's (2000) method is to establish trust with respondents. Tangible rewards are one way to achieve this, but it has already been noted that this is avoided in this research. Sponsorship by a legitimate organization is another method to gain trust. The perceived or real association the research has with the University of Missouri – St. Louis (UMSL) or organizations that send the survey to their members may be beneficial since many people are inclined to respond in an effort to support group values or because it may invoke social values since they could feel like they owe something to an organization related to the study. A final method related to trust is to make note of the importance of the study. Since many have claimed that collaboration is the future of SCM, this should not be difficult to convey. The cover letter is a key area where potential respondents are informed about the purpose of the survey and the factors above related to rewards, costs, and trust are incorporated.

The questionnaire utilized in the research is pretested by having supply chain academics and professionals review it in order to ensure questions are precise, accurately worded, and understandable by the target audience. Dillman (2000) notes that pretesting is a critical part of questionnaire design, but it is often done poorly or even completely overlooked. Therefore, it is a step that is not overlooked in this research in order to make every effort to achieve quality results. He also notes that question layout and flow should be similar to that of a conventional paper survey. This includes issues such as avoiding having multiple columns of responses for a given question, minimizing use of questions that require respondents to check all applicable answers, and using shorter, simpler words that are easier to read and interpret. In

addition to these types of suggestions, the survey will also include an open-ended question at the end asking if respondents have additional comments that were not covered by the survey. This may provide insights or identify issues that could be candidates for future research.

2.3 Data Analysis

Multiple data analysis techniques will be used on the quantitative survey response data in order to try to gauge the standing of collaboration in the present supply chain environment. This analysis will be conducted using IBM SPSS Statistics Version 21 and IBM SPSS Amos Version 21. Descriptive statistics will be utilized to provide information about the firms and individuals involved in the survey. While this will not provide any groundbreaking statistical insights into the data, it will provide an overview of the survey respondent group and give details of what types of firms and supply chain professionals participated. Standard mathematical tools like totals, means, and proportions of the responses for various questions from all respondents will also be used for hypotheses 1 and 2 to provide insight into which practices are commonplace for respondents and their firms. Measures of variability will also be considered in order to support the averages and provide insight into the level of agreement or disagreement among the respondents. Hypotheses 3 through 5 will be tested using the structural model that is pictured in Figure 5 to determine if there is any evidence between collaborative practices leading to performance improvements for firms.

H1a/b will be measured with the collaboration scale comprised of survey questions 9A-9J. These questions will be factor analyzed to ensure they are measuring the same factor, and a potentially smaller set of questions from that scale will be used. The remaining questions will be averaged to compare to the 4 stage supply chain continuum, and the hypotheses will be rejected if extreme averages result that are below 2 or above 4 since a 5 point Likert scale is being utilized. This information will also present the opportunity to identify areas where respondent firms need improvement in their collaborative activities.

The group of H2 hypotheses will be factor analyzed to ensure each dimension of collaboration scale is measuring the same factor. Information sharing will be measured with survey questions 11-14, decision synchronization with questions 15-22, incentive alignment with questions 23-28, and trust with questions 29-35. The analysis of variance (ANOVA) with repeated measures design will then be used to identify whether or not the differences in the dimensions are meaningful. For this procedure, identically worded questions 11, 20, 26, and 33 will be compared, as well as identically worded questions 13, 21, 27, and 34. These questions that comprise the variables of the repeated measures design are measurements of the importance of each dimension to respondents and their firms. This method is appropriate for this analysis since there are three group means that need to be compared using a within-subjects design. With this analysis, it is possible to see whether or not the mean scores are significantly different by analyzing the *F* value and its significance level. It also makes it possible to see how much each pair of dimensions from the two hypotheses contributed to this difference

by looking at their pairwise comparisons. Lastly, prescriptive suggestions are again possible by analyzing the data and seeing where respondent firms are struggling in their collaborative efforts related to these three dimensions.

Hypotheses 3 through 5 will be measured with the structural model that is pictured in Figure 5. The group of H3 questions seeks to determine how each dimension of collaboration correlates to collaboration practice, and the arrows in the model above indicate the relationship. H4 is a measure of how collaboration impacts performance and H5 seeks to measure how trust impacts performance, and each of these relationships is also represented by an arrow in the model above. These items will be measured with structural equations and it is expected that they will have a positive and significant relationship. These causal relationships would confirm the hypotheses H3 through H5.

The semi-structured interviews will also be analyzed in depth, but the nature of this type of research does not allow for rigorous analysis of the data that produces hard, quantitative results. Instead the qualitative data collected from each interview respondent will be categorized based on topic. Comparing these categories between different respondents will allow for connections to be made that will create what Seidman (1998) refers to as themes. These themes that are identified and common among respondents will be identified as the critical issues related to supply chain collaboration and the bulk of what is reported in the results of this paper. The interviews will also provide a more in-depth exploration of potential issues to add to the internet survey, as well as to allow respondents to identify and discuss other issues that

they believe are critical to supply chain collaboration. This approach that unties respondents from a predetermined set of survey questions could provide invaluable insights that make the results of the research much more enlightening.

2.3.1 Conclusions

Each of the hypotheses presented in this paper have an analysis plan in mind. Survey questions are referred to by their code number, which can be seen on the survey instrument in the Appendix. While these outcomes will largely be based upon the survey data, key conclusions from the interviews could also impact the results. Also, while the hypotheses do not utilize the data from every single question, the information obtained from these control questions that are not specifically utilized can still provide valuable information regarding the current state of collaboration. Hypothesis 1 will be analyzed using a combination of interview and survey data. Interview data will be critical since respondents will be asked about their involvement with different collaboration-related activities. While it is expected that cooperation and coordination will likely be common, it is not expected that the depth of collaboration will be reached. However, survey data will also play a key role since the information gained from the section of the questionnaire relating to the collaboration continuum may provide important insights. Hypothesis 2 will be analyzed by considering the responses to the survey questions relating to the dimensions of collaboration. Averages will be calculated for each section and considered over the group of respondents to determine which dimension is the most commonly utilized. As hypothesis 2 indicates, it is expected that information sharing should be the most common dimension. Lastly,

hypothesis 3 will use questions related to how firms and supply chains have experienced performance improvements from participating in collaboration or collaborative initiatives. This can be compared to the reported benefits that interviewees report to provide a more complete picture of how utilizing this strategy can improve firm and supply chain outcomes.

Chapter 3 – The Collaboration Study

Semi-structured interviews were conducted with purchasing professionals to better identify their feelings of collaboration and how they utilize the strategy. These interviews were an attempt to understand the experiences of respondents and the lessons they have learned from their experiences in their supply chain relationships (Seidman, 1998). They also served as a way to identify key areas of collaboration that could then be used to refine the items included in the second part of the study, which involved a survey of purchasing professionals.

An analysis of the interviews was conducted to identify areas that were overlooked in the original draft of the internet survey. The information provided by respondents made it clear that information related to the collaboration continuum and the dimensions of collaboration were both relevant, but a key area mentioned repeatedly in interviews that the original draft of the survey overlooked was trust. Therefore, a scale measuring how survey respondents gauge how their firm trusts its suppliers was added to account for this discrepancy. This was from a previous scale developed by Johnston et al (2004).

Another key area that interviewees repeatedly noted as critical was communication. As a result, the dimension "Collaborative Communication" was added to the survey to account for its criticality, which was developed by Cao and Zhang (2011). They define this as "the contact and message transmission process among supply chain partners in terms of frequency, direction, mode, and influence strategy."

The survey was reviewed by academics and professionals to ensure precise and understandable wording. This helped to avoid response bias by having wording that was objective and not leading. It also served to limit the problem of alternative interpretations altering how different respondents read a given question.

3.1 Semi-structured Interviews

The methodological portion of the study was commenced by conducting semi-structured interviews with purchasing professionals to gain insights into the collaboration practices of their firms and identify areas of the survey that need to be altered. A goal was to reach a broad cross-section of interviewees from different industries to gain a wide variety of perspectives.

Interview Firm	Industry
1	Government
2	Manufacturing
3	Manufacturing
4	Transportation
5	Government
6	Academic
7	Healthcare
8	Manufacturing
9	Healthcare

Figure 6 Interviewee industries

Nine purchasing professionals were interviewed using the interview guide in the Appendix. This number exceeds the minimum of eight suggested by McCraken (1988). While interviewees were guaranteed anonymity, they represented multiple industries, including academia, manufacturing, government, and transportation. Figure 6 outlines these interviewees and their industries. Each interview took approximately one hour to complete, and extensive notes were taken in order to record the thoughts of interviewees. In the event that clarity was needed to ensure complete and accurate notes, interviewees were asked to clarify their point or confirm the interpretation of the interviewer was correct.

The results of the interviews are promising since each respondent was very knowledgeable about collaboration practices and most represented firms that are involved with close relationships at some level. A key in these interviews was that much consistency existed between the different respondents regarding their views of collaboration and how their firm uses the strategy. This consistency provided a level of assurance since not only is collaboration a realistic approach for firms in the present purchasing environment, but these firms from different industries are viewing it and practicing it in a similar manner. This also led to a level of redundancy in the data, which suggests that the information captured contains all relevant concepts and is consistent with the practice of using grounded theory (Suddaby, 2006). Although it was clear that themes were developing while in the process of conducting the interviews, thorough analysis was delayed until all interviews were complete in order to avoid potentially leading respondents into discussing the same topic and ensure results were valid.

Each interview was started by having respondents provide their definitions of both supply chain management and collaboration. These definitions were generally well-stated and consistent with what one might find in a textbook. However, the definitions for supply chain management were typically rather local in nature. In other words, they focused on how a product gets to the interviewee's firm rather than a more complete view of the supply chain as a whole. Thus, respondents seem to have an internal focus on the firm rather than an external view of the supply chain, and some even considered only their specific position within the firm. This is consistent with the

findings of Fawcett and Magnan (2002), who found that "perceptions regarding the integrative nature of SCM varied significantly across channel position."

Collaboration definitions were also local in nature since they focused on one or more specific relationships the interviewees experienced at their respective firm rather than a broad all-encompassing example, but two key points were made. One respondent noted how intrafirm collaboration is just as critical as interfirm collaboration, which is consistent with the finds of Barratt (2004). Another noted the blurred distinction between competitor and partner since her firm both competes and partners with certain external organizations, which is similar to the previously noted example of Apple and Samsung. This collaboration with partners was specifically mentioned as occurring in what was referred to as "coops", which is when the firm partners with other organizations to achieve economies of scale in purchasing.

3.1.1 Communication

The interview results have been broken down into themes (Seidman, 1998) that center around key aspects of supply chain collaboration. These include communication, trust and accountability, a strategic mindset, and supplier selection and evaluation. Communication was the most commonly used word in each interview that was conducted and the response each respondent provided when asked to identify the most critical aspect of collaboration. This emphasizes that sharing knowledge and information is critical if partners want to work closely and improve the supply chain. This intense communication was reported to be conducted almost entirely by means of informal methods, including e-mails, phone calls, and meetings. However, it was

important that they did note that whether it was formal or informal, open lines of communication existed in all partnerships.

While the literature notes the power and usefulness of EDI, none of the respondents reported that their firms utilized the technology. This was reported as being at least partially due to the complications that arise with needing common software or hardware. However, one respondent noted that her firm has developed a web-based communication system where partners can simply share the required information via the Internet rather than having a direct link. Even without EDI links, all respondents pointed out that they either currently have shared goals with suppliers or they are working on establishing them. These goals are mutually determined through an open communication process that allows both organizations to provide their input in creating the targeted ambitions.

A key area where communication was noted as being vital was in the development and production of new products that are critical to a purchasing firm's business. Ensuring these products meet what can often be very strict specifications to correspond with firm, industry, and government regulations means that the partners must be in very close contact to ensure the requirements are known and any issues are solved. An example of this was provided by an interviewee representing a class I railroad. She noted that locomotives are extremely complex, expensive, and customized products, so they work closely with suppliers to ensure production and design meet requirements. Other less critical items, such as janitorial or office supplies, were

reported to be treated more like commodities that were purchased based almost solely on price and availability.

Communication was also reported to be vital with managing problems that arise between partner firms. This could involve physical meetings, an escalation process, or a simple phone call to try to address the issue. If problems are unable to be solved between firms then termination of the partnership was noted as an option. While communication was noted as being a major area where firms can improve their relationships, it was also noted to be a cause of relational problems. A major barrier of supplier relationships noted by respondents was a lack of communication in the form of inaccurate and poorly timed information. Thus, timely, accurate, and consistent communication that is frequent and clear was noted as being an essential factor to supply chain relationships.

3.1.2 Trust and Accountability

Trust and being accountable for partner firms were also key issues that were consistently noted in the semi-structured interviews. This could involve meeting deadlines, respect for each other that extends throughout the firms, keeping each other's best interests in mind, maintaining quality, or not being dishonest. Accountability can also extend to customers since it is the duty of upstream firms to ensure the product is right for downstream firms and end users. While formalization of a relationship with tools like contracts, master supply agreements, using a quote as a binding agreement, or even verbal agreements were all reported to be used, trust was

mentioned as a key factor in all of these situations since each partner should feel confident a firm will do its job in the right way.

Trust is a key factor that respondents reported in determining the success or failure of a relationship. If a partner adhered to the agreement and simply did what they said they were going to do, then respondents noted that the relationship would typically be considered a success. Others went into more detail by using supplier scorecards, but these still took the factors of trust and accountability into consideration. The underlying implications of partnering with firms that are not trustworthy include failed relationships, subpar products or services, and a poor customer experience.

3.1.3 Strategic Mindset

When asked why their firms are engaged in close relationships with suppliers, respondents noted they wanted to establish strategic, long-term partnerships with their suppliers, and some even suggested that the market is trending toward this being a requirement. They noted that over time the relationships have transitioned from being the traditional, combative arrangement where price is the only factor to a more strategic arrangement.

While this applies to suppliers that the firm relies on for important goods, other suppliers of commodity type items are less strategic and more price-based. Thus, while price is still very important, switching suppliers is not as common since other issues like service and availability are also taken into consideration. This move away from the traditional model has led to improvements that were reported in respondent businesses, including cost savings, improved quality, and increased service levels.

3.1.4 Supplier Selection and Evaluation

Despite the general feeling that interviewee firms are now in a much more strategic, partnership-oriented frame of mind, all noted that price is still a significant factor (and often the primary factor) in determining whether or not to establish a relationship with a supplier. However, it is also critical to note that interviewees also mentioned that factors other than price, such as service or total cost during a product's life cycle, are very important.

Respondents claimed that supplier selection is most commonly started with a bid process where the purchasing firm can initially consider potential partners on price alone. Meetings typically follow to outline requirements, and if the potential supplier can meet the firm's needs then they are considered in the final selection process. One firm even gives potential suppliers practice orders so they can see how good they perform in areas like service, quality, and meeting deadlines. A unique consideration that the class I railway is responsible for in its evaluation and selection of suppliers is a thorough background investigation since they must be on the lookout for potential terrorist activities. Thus, some criteria are unique to individual firms or industries.

3.2 Internet Survey

An internet survey was conducted as the second phase of the research to provide quantifiable evidence of how purchasing professionals and their firms are utilizing collaboration in their supply chain relationships. The survey was developed using Churchill's (1979) framework for construct development, which emphasized

utilizing existing measures whenever possible. To achieve this goal, the first step in creating the survey was to conduct a thorough review of the literature to serve as the foundation for the list of items. Included in this initial list were 9 items related to the collaboration continuum, 13 items related to dimensions of collaboration, and 6 items related to performance improvements. A 5-point Likert scale was used to indicate the level of agreement purchasing professionals had with each statement, with 1 indicating strong disagreement and 5 indicating strong agreement.

A pilot study was conducted on the original survey instrument to gain insights on its clarity, language, and content. This study was completed by academics and the 9 purchasing professionals that participated in the semi-structured interviews. These individuals provided insight into how the survey could be improved. After the survey was edited to reflect the suggestions of the pilot study, a full-scale survey was conducted.

The live survey was sent to purchasing professionals that were members of the American Purchasing Society and the Supply Chain Management Association in each organization's respective monthly e-mail newsletter, as well as clients of the consulting firm Supply Velocity and professional contacts of the author. The American Purchasing Society sent the survey to 4,337 people in a single wave, and this yielded 67 responses. The Supply Chain Management Association sent it to an unclear amount of its members claimed to be in the several thousands, which yielded 4 total responses. Supply Velocity sent the survey to an undefined number of recipients, and this yielded 13 responses. Including survey responses from professional contacts, 97 surveys were submitted and

11 of them were omitted due to being incomplete. Therefore, the final sample size was 86 completed surveys. A link to this file can be found in the Appendix.

Respondent backgrounds varied across the sample that completed the survey. The majority classified themselves as a buyer or manager at their respective firm. Most had a formal supplier agreement in place, and this was most commonly in the form of a contract. Nearly half of the firms had over 500 employees, and most had an annual sales volume of less than $100 million or greater than $250 million. Annual purchasing volume followed a similar pattern. Finally, nearly all participants reported working for private firms, with only a few working at public or government-related organizations.

3.2.1 Reliability and Factor Analysis

Before finalizing the scales to conduct data analyses, reliability and factor analyses were conducted to ensure the scales were measuring what they were intended to measure and that they did in fact represent a single factor. Figure 7 outlines the key measures in this analysis. Principal components factor analysis was conducted using the SPSS principal components analysis procedure. Each scale had a Kaiser-Meyer-Olkin measure of sampling adequacy that was well above the 0.5 minimum that is considered necessary in order to use factor analysis on the data (Frolich and Westbrook, 2001).

Scale	Kaiser-Meyer-Olkin Adequacy	Bartlett Test of Sphericity	Eigenvalue	% of Variation	Cronbach's Alpha
Collaboration Continuum	0.828	417.662, $p < 0.000$	4.608	51.196	0.867
Information Sharing	0.749	398.898, $p < 0.000$	4.313	61.609	0.882
Decision Synchronization	0.802	273.539, $p < 0.000$	3.965	49.560	0.846
Incentive Alignment	0.857	180.668, $p < 0.000$	3.419	56.986	0.840
Collaborative Communication	0.834	242.533, $p < 0.000$	3.852	55.028	0.860
Performance Improvement	0.843	263.031, $p < 0.000$	3.874	64.571	0.889
Trust	0.722	163.368, $p < 0.000$	2.701	67.513	0.824

Figure 7 Reliability and factor analytic statistics

Scores above 0.8 are considered to be very good, and none were below 0.72. Also, each had a Bartlett's test of sphericity score that was significant at the $p < 0.000$ level, providing additional evidence that there is a correlation between the variables in each scale.

All but two scales loaded onto a single factor using the principal components procedure. This included the information sharing and trust scales. The information sharing scale had an initial alpha value of 0.857 and loaded onto two factors. However, eliminating question 12 allowed the alpha value to increase to 0.882 and led to a single factor. Therefore, question 12 was removed from the survey and all future analyses. Similarly, the trust scale had an initial alpha value of 0.795 and loaded onto two factors, but it was clear that eliminating question 36 would allow the alpha value to increase to 0.824 and lead to a single factor for the scale. Therefore, question 36 was removed from the survey and all future analyses. Item 9E was also removed from the collaboration continuum scale since it led to an improvement in the alpha value from 0.861 to 0.867.

	Demographic Variables						
Scale	Formal Agreement	Contract Length	Firm Role	Number of Employees	Annual Sales	Annual Purchasing	Respondent Role
Collaboration Continuum	-0.032	0.070	0.158	-0.182	-0.133	-0.096	-0.184
Information Sharing	-0.142	-0.092	0.103	-0.076	-0.006	-0.043	-0.148
Decision Synchronization	0.004	-0.070	-0.034	0.122	0.153	0.138	0.049
Incentive Alignment	0.102	-0.077	0.115	0.074	0.160	0.114	0.133
Collaborative Communication	0.061	0.067	0.003	0.139	0.112	0.132	0.070
Performance Improvement	0.042	0.050	0.281*	0.073	0.110	0.131	-0.262*
Trust	-0.144	-0.137	0.011	-0.082	-0.099	-0.062	-0.078

* Significant at $p < 0.05$

Figure 8 Correlations between scales and demographic variables

The SPSS reliability technique was used to measure internal consistency of each of the scales. Figure 7 indicates that the reliability of all scales was acceptable according to widely accepted guidelines, which indicate that the Cronbach's alpha value should be at least 0.7 (Flynn et al, 1990). In addition, construct validity was confirmed using Flynn et al's (1995) example since each scale had items that all load on a common factor and the eigenvalues are all well above the threshold of 1.

Each scale was compared to demographic variables from the survey by using the SPSS bivariate correlation procedure in order to test discriminate validity. The results are outlined in Figure 8, which indicates minimal interference from background factors aside from the fact that firm position or role may have an impact on perceived performance improvements gained from collaborative initiatives. In other words, the scales did not measure unintended constructs. Bivariate correlations were also analyzed to see the relationships that exist between each of the survey scales. Figure 9 outlines the results, which indicate significant relationships between all of the scales.

Scale	Collaboration Continuum	Information Sharing	Decision Synchronization	Incentive Alignment	Collaborative Communication	Performance Improvement	Trust
Collaboration Continuum	-	0.653**	0.579**	0.511**	0.537**	0.372**	0.625**
Information Sharing		-	0.567**	0.505**	0.560**	0.336*	0.549**
Decision Synchronization			-	0.741**	0.732**	0.352**	0.509**
Incentive Alignment				-	0.696**	0.464**	0.423**
Collaborative Communication					-	0.370**	0.575**
Performance Improvement						-	0.242*
Trust							-

** Significant at $p < 0.01$

* Significant at $p < 0.05$

Figure 9 Correlations among survey scales

3.3 Analysis of Hypotheses

The five hypotheses were tested using the data collected with the internet survey. The first two hypotheses apply to respondents and their firms, and the remaining three relate to the structural model. The following sections describe the results of the analysis of each hypothesis.

3.3.1 Hypothesis 1

Hypotheses 1a and 1b suggest that firms have progressed beyond traditional, price-based relationships, but have not yet achieved truly collaborative relationships. These hypotheses were tested using the collaboration continuum scale from the internet survey. The averages of these scale items were computed, as well as an overall average of all questions in the scale in order to determine how firms practice collaboration as outlined by the collaboration continuum in chapter 1 (see Figure 3). These means can be found in Figure 10. Supporting the hypotheses, the results indicated some use of collaboration by purchasing professionals as a whole, but not to an excessive degree.

Respondents reported that they were quite open with suppliers, and that working together and cooperation were important for success. Collaboration was also reported to be fairly important overall. However, other data provided a less flattering perspective of how respondent firms are utilizing collaboration. For example, integrated operations were reported to be quite uncommon, and similar to the interview results EDI does not seem to have gained widespread use. Contradicting the

Question	Mean	Standard Deviation
My firm is open when dealing with suppliers.	4.06	0.97
My firm is willing to make cooperative changes with its suppliers.	3.74	1.16
My firm believes it must work together with suppliers to be successful.	4.00	1.11
My firm's goals and objectives are consistent with those of its suppliers.	3.31	1.18
My firm and its suppliers practice electronic data interchange (EDI).	3.08	1.51
My firm integrates operations with its suppliers by interlocking programs and activities.	2.55	1.20
My business and its suppliers have a strong and long-term relationship fostering cooperation with one another.	3.62	1.02
My business does not base its supplier relationships primarily on price.	3.47	1.20
My firm does not have a combative relationship with one or more suppliers.	3.21	1.43
How important is collaboration to your firm.	3.86	1.05
Average	3.49	

Figure 10 Collaboration continuum data

interview results, which indicated that it is extremely common to base supplier relationships on price, respondents gave the impression that price alone is not commonly used for evaluation. Finally, it appears that combative relationships still exist between channel partners and goals are not always consistent between firms.

The overall average of 3.49 for all questions in the scale and the results summarized above provide support for the hypotheses. In addition, 78.6% of all responses were above 2 and 75.9% of all responses were 4 or less. This makes it seem that the most extreme traditional, price-based relationships are no longer common. However, fully immersive collaborative relationships, where each firm essentially operates as an extension of the other, are apparently not yet widespread since less than

25% of the responses were the maximum of 5. It should also be noted that price-based and combative relationships may always exist to some extent.

Lastly, one-sided t-tests were conducted to determine if the response means differed from various bases. Since the hypotheses H1a and H1b posit that the average should be somewhere between the values of 2 and 4, the bases of 1 and 5 were initially tested. Both results had all variables come back significant ($p = 0.000$), which provides evidence that the mean values are different from 1 and 5. In addition, the bases of 2, 3, and 4 were tested, with the results of 2 being similar to those of 1 and 5. However, the bases of 3 and 4 had several questions with insignificant values, indicating there is not a significant difference. Therefore, hypotheses 1a and 1b are not rejected since it seems that firms are presently operating somewhere in the middle of the collaboration continuum. It should be noted that it seems that firms are operating closer to the collaboration extreme than the traditional, combative extreme.

3.3.2 Hypothesis 2

The group of H2 hypotheses compares the 4 dimensions of collaboration and proposes that collaborative communication and information sharing will be more common than decision synchronization and incentive alignment. These hypotheses were tested using the scales that measured the dimensions of collaboration, including information sharing, decision synchronization, incentive alignment, and collaborative communication. The analysis of variance with repeated measures design was used to identify if there was a difference in collaboration practice based on the dimensions. In other words, were the differences between the dimensions meaningful? Therefore, the

dependent variable for the analysis was "collaboration" and the independent variable was "dimension" (represented by the 4 dimensions of collaboration).

The analysis was conducted using the repeated measures procedure in SPSS for each group of questions. Identically worded questions 11, 20, 26, and 33 were compared, which indicate whether or not respondents reported that their firms frequently engage in the dimension under examination. Also, identically worded questions 13, 21, 27, and 34 were compared, which indicate the importance of each dimension of collaboration. Results for the first comparison are listed in Figure 11. This indicates that the mean value for how often information is shared is much higher than the other dimensions, with decision synchronization and incentive alignment having especially low values. Since Mauchly's test was insignificant (chi-square = 5.265, p = 0.384), which indicates that the variances of the differences are not significant, it can reasonably be determined that the sphericity assumption was not violated. Therefore, no corrections were used to alter the degrees of freedom in order to provide a valid, more conservative F-value. This value determined that the mean collaboration practice differed between dimensions (F = 68.333, $p < 0.01$).

The pairwise comparisons table in Figure 11 indicates where these mean differences existed. The figure makes it clear that there was a significant difference ($p <$ 0.01) in collaboration practice between information sharing and all other dimensions. There was also a significant difference between decision synchronization and collaborative communication, as well as incentive alignment and collaborative

Descriptive Data	Mean	Standard Deviation
Information Sharing	3.52	1.024
Decision Synchronization	2.19	0.988
Incentive Alignment	2.24	1.060
Collaborative Communication	3.18	1.055

Mauchly's Test	Chi-Square	Significance
	5.265	0.384

Within-Subjects Effects	F	Significance
	68.333	0.000

Dimension (I)	Dimension (J)	Mean Difference (I-J)	Standard Error	Significance	Lower Bound (95% confidence)	Upper Bound (95% confidence)
1	2	1.333	0.124	0.000	1.087	1.579
	3	1.286	0.126	0.000	1.035	1.537
	4	0.345	0.117	0.004	0.113	0.577
2	1	-1.333	0.124	0.000	-1.579	-1.087
	3	-0.048	0.111	0.669	-0.268	0.173
	4	-0.988	0.106	0.000	-1.200	-0.776
3	1	-1.286	0.126	0.000	-1.537	-1.035
	2	0.048	0.111	0.669	-0.173	0.268
	4	-0.940	0.104	0.000	-1.146	-0.735
4	1	-0.345	0.117	0.004	-0.577	-0.113
	2	0.988	0.106	0.000	0.776	1.200
	3	0.94	0.104	0.000	0.735	1.146

Figure 11 Analysis of variance with repeated measures: collaboration engagement

communication. This suggests that different dimensions of collaboration have significantly different impacts on collaboration practice. More specifically, it appears that firms engage in information sharing more frequently than other dimensions, and collaborative communication is engaged in more frequently than either decision synchronization or incentive alignment.

The second set of questions indicated the importance of each dimension from the perspective of respondents, and the analysis of variance with repeated measures information for that comparison is located in Figure 12. The mean values for information sharing and collaborative communication are again higher than those of

decision synchronization and incentive alignment. Mauchly's test was significant (chi-square = 13.125, p = 0.022), so evidence exists that the sphericity assumption was violated. Therefore, the Huynh-Feldt correction was applied since the Epsilon value was well above 0.75. This led to the conclusion that there were significant differences between the dimensions in their use of collaboration ($F = 15.288$, $p < 0.01$).

Figure 12 outlines the pairwise comparisons for the second repeated measures procedure. There was a significant difference between information sharing and both decision synchronization and incentive alignment. There was also a significant difference between collaborative communication and both decision synchronization and

Descriptive Data	Mean	Standard Deviation
Information Sharing	3.35	1.192
Decision Synchronization	2.78	1.248
Incentive Alignment	2.81	1.200
Collaborative Communication	3.55	1.160

Mauchly's Test	Chi-Square	Significance
	13.125	0.022

Within-Subjects Effects	F	Significance
	15.288	0.000

Dimension (I)	Dimension (J)	Mean Difference (I-J)	Standard Error	Significance	Lower Bound (95% confidence)	Upper Bound (95% confidence)
1	2	0.576	0.155	0.000	0.269	0.884
	3	0.541	0.164	0.001	0.214	0.868
	4	-0.200	0.147	0.176	-0.492	0.092
2	1	-0.576	0.155	0.000	-0.884	-0.269
	3	-0.035	0.123	0.776	-0.281	0.210
	4	-0.776	0.121	0.000	-1.017	-0.536
3	1	-0.541	0.164	0.001	-0.868	-0.214
	2	0.035	0.123	0.776	-0.210	0.281
	4	-0.741	0.129	0.000	-0.997	-0.485
4	1	0.200	0.147	0.176	-0.092	0.492
	2	0.776	0.121	0.000	0.536	1.017
	3	0.741	0.129	0.000	0.485	0.997

Figure 12 Analysis of variance with repeated measures: collaboration importance

incentive alignment. Thus, the results indicate that respondents found information sharing and collaborative communication to be more important than either decision synchronization or incentive alignment. Therefore, the group of H2 hypotheses is not rejected since the evidence outlined above support those claims. However, hypothesis 2a may be in question since it seems that information sharing may be more prevalent than collaborative communication.

3.3.3 Hypotheses 3, 4, and 5

The final three hypotheses stated that the dimensions of collaboration are positively related to collaboration practice, and that higher levels of collaboration and trust will lead to improved performance. Structural equation modeling (SEM) was used to measure the impact of the dimensions of collaboration on collaboration practice, as well as trust and collaboration practice on firm performance. Testing was completed in IBM SPSS Amos Version 21 software using the process outlined by Brunch (2008). The model consisted of two parts, including a structural model and a measurement model (Tan, 2001b). The structural model outlines the causal relationships between the latent variables, while the measurement model deals with the constructs and their ability to measure the latent variables. Each of the scales represented one of these latent variables, which are unable to be measured directly but rather by a series of questions that comprised the scale. These questions served as the manifest variables for the model.

The initial structural model used each question from all respective scales as manifest variables to represent each of the latent variables that were unable to be

measured directly, which led to a total of 49 of these variables in the model. Based on commonly accepted guidelines for SEM and sample size, such as ten observations per indicator variable (Nunnally, 1967), this model would have required at least around 500 respondents. The results of the model included a very high value for χ^2 that was highly significant ($p < 0.01$).

A second approach involved using composites of each scale as manifest variables, which served to drastically reduce the required sample size since each latent variable had only a single variable representing its measurement. Results for this model, including parameter estimates, can be seen in Figure 13 and a full output can be seen in the Appendix under the title "Composite Model 1". While the change in approach did lead to an improvement in initial fit values ($\chi^2 = 11.669$, $p = 0.040$), other measurements of fit were less than promising. For example, the comparative fit index (CFI) value for the model was 0.976, which is good since values above 0.95 indicate a

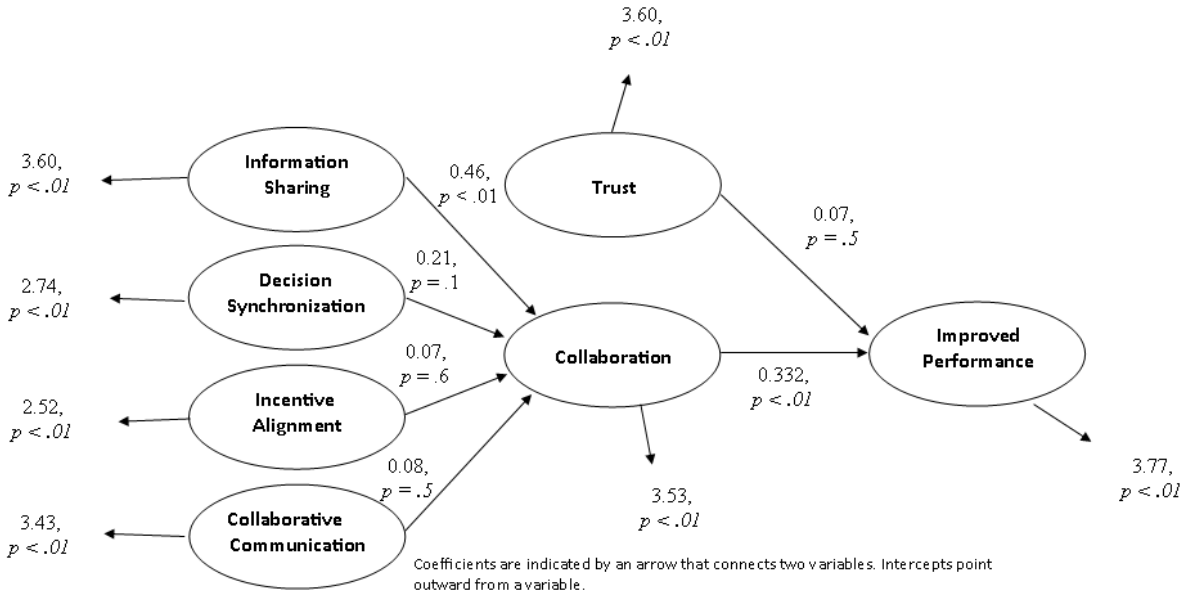

Figure 13 Summary of structural model findings

good fit (Bentler, 1990). While the numbers reported thus far seem reasonable, a problem arises when the Root Mean Square Error of Approximation (RMSEA) is examined. This value is equal to 0.125, which is above the level of 0.10 that Brunch (2008) suggests as a maximum RMSEA for a model to be considered acceptable. Based on this data, it would appear that the model is a poor fit and should be rejected.

In order to provide supporting evidence for the structural model findings, regression analyses were conducted using the factor scores associated with the relationships in Figure 13. Separate regressions were conducted to see the effects of the dimensions of collaboration on collaboration, as well as collaboration and trust on improved performance. The results from these regressions are presented in Figure 14. Both models are statistically significant based upon their *F* statistics. Note how information sharing appears to have a positive and significant relationship with

	Dimensions ---> Collaboration Continuum	Collaboration Continuum, Trust ---> Improved Performance
Information Sharing	0.44 ($p < 0.01$)	
Decision Synchronization	0.23 ($p = 0.097$)	
Incentive Alignment	0.03 ($p = 0.80$)	
Collaborative Communication	0.11 ($p = 0.40$)	
Collaboration Continuum		0.36 ($p < 0.01$)
Trust		0.01 ($p = 0.93$)
R^2	0.49	0.14
F Value, Significance	19.44 ($p < 0.01$)	6.68 ($p < 0.01$)

Figure 14 Factor score regression analyses

collaboration, as well as decision synchronization to a lesser degree. In addition, collaboration practice seems to have a positive and significant impact on performance, but trust has little impact. Finally, the variance inflation factor (VIF) scores were examined for each variable, and since all were less than 3 it appears that multicollinearity was not an issue in either model.

It should be noted that the values in Figure 13 and Figure 14 are similar, but not exactly the same. The regression model uses least squares and is based on one equation at a time. The SEM applies to the system of equations and considers the covariance among all of the variables in the model. It uses maximum likelihood estimation and requires the assumption of normality. Thus, SEM is often considered an extension of regression (Hyu, 2010).

The standard analysis includes both the control variables and those that are being tested in the same run, both for the regression and for the SEM. This will increase the R^2 and may increase the significance level of the variables being tested. The section

	Model 1			Model 2		
Variable	*Unstandardized B*	*SE B*	*Standardized Beta*	*Unstandardized B*	*SE B*	*Standardized Beta*
Firm Size	-0.129	0.111	-0.200	-0.117	0.078	-0.183
Annual Sales	-0.118	0.296	-0.110	-0.185	0.208	-0.173
Annual Purchasing	0.155	0.269	0.137	0.136	0.188	0.120
Contract	-0.088	0.425	-0.025	0.069	0.299	0.019
Information Sharing				0.401	0.105	0.379**
Decision Synchronization				0.248	0.135	0.241
Incentive Alignment				0.067	0.127	0.066
Collaborative Communication				0.197	0.135	0.187
R^2	0.045			0.581		
F, Sig.	0.870, 0.486			12.143, 0.000**		

** $p < .01$

Figure 15 Hierarchical regression for collaboration continuum

below indicates that this is not likely to be of much help, but by itself it does not tell us much of anything.

Hierarchical regression analysis was also conducted on each model using the SPSS Regression procedure in order to account for the effects of covariates. These included firm size, annual sales volume, annual purchasing volume, and whether or not a formal agreement exists between respondent firms and any of their suppliers.

The first regression considered the dimensions of collaboration on collaboration. Results can be seen in Figure 15. They indicate that the control variables had little impact on the regressions. Evidence includes a low model 1 R^2 value of 0.045, which increased to 0.581 for model 2. In addition, model 1 had an insignificant *F* value while model 2 was significant. Lastly, model 1 had no significant coefficients, but model 2 had one significant at the $p < 0.01$ level and another that is significant at the $p < 0.10$ level.

The second regression, which considered the effects of collaboration and trust on performance, is presented in Figure 16. It is again clear from the results of model 1 that the control variables had little impact on the results of the regressions. Evidence to

	Model 1			Model 2		
Variable	*Unstandardized B*	*SE B*	*Standardized Beta*	*Unstandardized B*	*SE B*	*Standardized Beta*
Firm Size	-0.004	0.112	-0.006	0.053	0.105	0.083
Annual Sales	-0.073	0.298	-0.068	-0.025	0.275	-0.024
Annual Purchasing	0.206	0.271	0.183	0.141	0.250	0.125
Contract	0.100	0.429	0.028	0.129	0.398	0.036
Trust				-0.022	0.131	-0.022
Collaboration Continuum				0.436	0.135	0.439**
R^2	0.018			0.191		
F, Sig.	0.340, 0.850			2.831, 0.016**		

** $p < .01$

Figure 16 Hierarchical regression for performance

support this claim includes a very low value of 0.018 for R^2, and neither the *F* value nor any of the coefficients were significant. Model 2 had a higher value for R^2 of 0.191, indicating it accounted for a large majority of the variability, as well as a significant *F* value and a significant coefficient.

Based upon the results of both the structural model and regression analyses, it appears that there is evidence to support H3a and H3b, which indicate that information sharing and decision synchronization are positively related to collaboration. However, H3c and H3d are not supported and are rejected based on the data from this analysis. Since there was a positive and significant relationship between collaboration practice and performance, H4 is supported and not rejected. Finally, H5 is rejected since trust does not appear to have a positive impact on performance.

3.3.4 An Alternative SEM

Due to the failure of the original model to have sufficient fit, an alternative model was investigated that considered the impact of trust on collaboration rather than performance. Composites were again used for the variables, and results of this revised model are quite promising since fit values are well within recommended limits. A full output can be seen in the Appendix under the title "Composite Model 2". The chi-square value of 5.455 (p = 0.363) is insignificant, which is one piece of evidence supporting a good fit. In addition, the CFI value of 0.998 is well above the suggested limit of 0.95 (Bentler, 1990). Finally, the RMSEA value of 0.033 is below the suggested maximum of 0.10 by Brunch (2008). With this evidence to support the revised model, it appears that it is a good fit overall.

The revised measurement model results can be seen in Figure 17. Certain aspects of the findings are similar to the original model since information sharing has a positive and significant impact on collaboration, but the minimal relationship between decision synchronization and collaboration now appears to be gone. In addition, trust appears to have a positive and significant relationship with collaboration.

In order to provide supporting evidence for the structural model findings, regression analyses were conducted using the factor scores associated with the relationships in Figure 17. Separate regressions were conducted to see the effects of the dimensions of collaboration and trust on collaboration, as well as collaboration on improved performance. The results from these regressions are presented in Figure 18. Both models are statistically significant based upon their *F* statistics. Note how both information sharing and trust appear to have a positive and significant relationship with

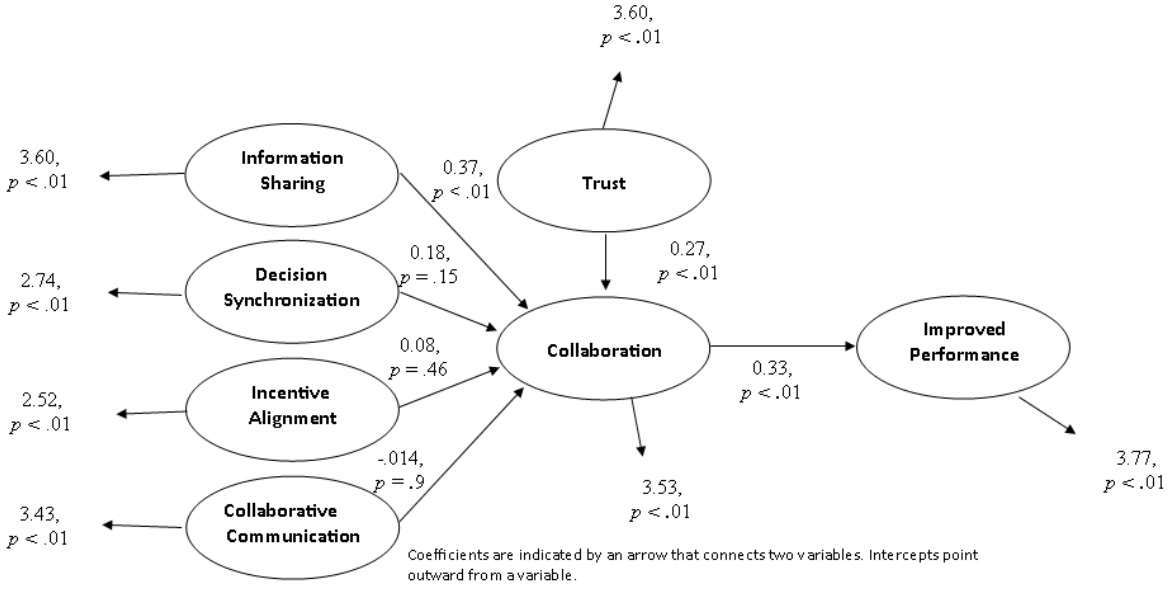

Figure 17 Revised SEM

	Dimensions, Trust ---> Collaboration Continuum	Collaboration Continuum ---> Improved Performance
Information Sharing	0.35 (p < 0.01)	
Decision Synchronization	0.19 (p = 0.15)	
Incentive Alignment	0.04 (p = 0.72)	
Collaborative Communication	0.03 (p = 0.79)	
Trust	0.26 (p = 0.01)	
Collaboration Continuum		0.37 (p < 0.01)
R^2	0.53	0.14
F Value, Significance	17.88 (p < 0.01)	13.36 (p < 0.01)

Figure 18 Factor score regression analysis for revised model

collaboration. In addition, collaboration seems to have a positive impact on performance. Lastly, the VIF scores were examined for each variable and multicollinearity does not appear to be a problem since all scores were below 3.

Hierarchical regression analysis was also conducted on each model using the SPSS Regression procedure in order to account for the effects of covariates. These included firm size, annual sales volume, annual purchasing volume, and whether or not a formal agreement exists between respondent firms and any of their suppliers.

The first regression considered the dimensions of collaboration and trust on collaboration. Results can be seen in Figure 19. They indicate that the control variables had little impact on the regressions. Evidence includes a low model 1 R^2 value of 0.031, which increased to 0.678 for model 2. In addition, model 1 had an insignificant F value while model 2 was significant. Lastly, model 1 had no significant coefficients, but model 2 had three significant coefficients, including one at each of the $p < 0.01$, $p < 0.05$, and $p < 0.10$ levels.

	Model 1			Model 2		
Variable	*Unstandardized B*	*SE B*	*Standardized Beta*	*Unstandardized B*	*SE B*	*Standardized Beta*
Firm Size	-0.081	0.089	-0.159	-0.067	0.054	-0.132
Annual Sales	-0.106	0.236	-0.125	-0.167	0.147	-0.198
Annual Purchasing	0.13	0.215	0.145	0.135	0.132	0.151
Contract	-0.010	0.339	-0.004	0.200	0.211	0.071
Information Sharing				0.389	0.099	0.363***
Decision Synchronization				0.210	0.119	0.204*
Incentive Alignment				0.102	0.106	0.103
Collaborative Communication				0.133	0.124	0.124
Trust				0.189	0.087	0.200**
R^2	0.031			0.678		
F, Sig.	0.579, 0.678			15.945, 0.000***		

*** $p < .01$
** $p < .05$
* $p < .10$

Figure 19 Hierarchical regression for collaboration continuum: revised model

The second hierarchical regression, which considered the impact of collaboration on performance, is presented in Figure 20. It is again clear that the control variables had little to no impact on the results of the regressions. Evidence includes a low model 1 R2 value of 0.019, which increased to 0.187 for model 2. In addition, model 1 had an insignificant *F* value while model 2 was significant. Lastly, model 1 had no significant coefficients, but model 2 had the Collaboration Continuum significant at the $p < 0.01$ level.

	Model 1			Model 2		
Variable	*Unstandardized B*	*SE B*	*Standardized Beta*	*Unstandardized B*	*SE B*	*Standardized Beta*
Firm Size	-0.010	0.078	-0.022	0.021	0.072	0.047
Annual Sales	-0.013	0.209	-0.018	0.021	0.191	0.028
Annual Purchasing	0.124	0.190	0.157	0.085	0.174	0.108
Contract	0.166	0.300	0.027	0.070	0.275	0.028
Collaboration Continuum				0.365	0.094	0.417**
R^2	0.019			0.187		
F, Sig.	0.358, 0.837			3.367, 0.009**		

** $p < .01$

Figure 20 Hierarchical regression for performance: revised model

The purpose of investigating this alternative SEM model was to provide supplemental evidence of how the variables of interest correspond. The findings seem to provide strong evidence to support these variables. For example, the fit statistics are much stronger for the model, and the role of trust is more clearly defined by linking it with collaboration rather than performance. Therefore, it seems that this model will be able to provide a more significant contribution than its predecessor.

3.3.5 Conclusions

The results of this study provide evidence that the practice of supply chain management has not yet achieved its full potential in the procurement field. Firms seem to be maintaining a silo mentality that puts an emphasis on individual firm success rather than the well-being of the supply chain. The results related to the supply chain continuum support this since firms seem to be talking about collaboration, but not actually implementing it. Boundary spanning activities, such as joint planning or synchronized decision making, are mentioned freely when purchasing professionals talk about their supplier relationships, but they do not seem to be widespread in practice. The data supports this since it has been found that information sharing seems to occur much more freely than collaborative communication, decision synchronization, or incentive alignment. Thus, firms are well on their way to practicing what the literature defines as collaboration, but this will only occur with improvements in these areas that are lacking. Although it does seem to have a positive impact on collaboration, a key ingredient that seems to be missing from both the semi-structured interviews and to a lesser degree the survey results is trust. This is consistent with the findings of Fawcett

et al (2012), who note that few firms have established a level of trust that will allow them to reap the benefits of collaboration. Without this key aspect of collaboration, there will likely always be a significant barrier to any relationship. Although Ballou (2007) indicates that collaboration is the future of SCM, it appears that future has not yet been realized.

3.4 Discussion

Since organizations must work together for the good of all involved, relationships are critical components of any supply chain. While this should not be interpreted as a zero conflict situation, it does mean that situations in which obstacles arise must be handled appropriately. Of vital importance to relationships is information and knowledge sharing between parties. Knowing the intricacies of other firms within its supply chain will give a firm the ability to be more adaptable and better suited to serve the end customer. What must be avoided in this situation are opportunistic behaviors where a firm can benefit by sabotaging a channel partner whose sensitive information is at its disposal. Therefore, trust and commitment are important factors of supply chain relationships. The end result will be a well-integrated supply chain that can more effectively compete against rival supply chains.

This research has investigated how purchasing professionals utilize collaboration in their supplier relationships by utilizing semi-structured interviews and an internet survey. Key themes were identified in the interviews that practitioners seem to consistently view as being critical, including the criticality of communication, trust, and

accountability in relationships, as well as maintaining a strategic mindset that focuses on the supply chain as a whole rather than just individual firm success. The survey provided evidence that collaboration is still not a fully utilized strategy for the respondent firms. It also showed that firms seem to be engaging in information sharing much more than other dimensions of collaboration and higher-level initiatives like decision synchronization and incentive alignment are not nearly as common. An all-encompassing collaborative culture does not yet seem to be widespread, where firms can mutually benefit by reducing costs and inventory, and the final customer receives the best possible goods and services.

Williamson's (1975) transactional theory focuses on the exchanges that occur between buyers and sellers. Previous literature and this research have provided evidence that the development and early stages of collaboration are grounded in this theory. Information sharing, a key buyer-supplier exchange, was found to be of utmost importance in both the interviews and the survey. This theory is highly dependent on this dimension since buyers and sellers must exchange at least some degree of information even for the least collaborative relationships. While collaboration does relate to this theory, it is somewhat limiting since these close relationships need to do more than just transact with one another and leverage knowledge creation together (Malhotra et al, 2005). Thus, in the future it would be ideal for collaborative relationships to have grown beyond a transactional focus into a situation where firms work together as one.

Part of extending beyond a transactional view, with an emphasis on the supply chain rather than a silo mentality, can start with emphasizing the resource-based view (Barney, 1991; Japp, 1999). This view involves firms gauging their own assets in order to identify what they do best. Ideally, firms can focus on what they do best and a team of firms utilizing their core competencies can lead to a highly effective supply chain by combining their unique resources and abilities in difficult to imitate ways that lead to a competitive advantage (Dyer and Singh, 1998). This research suggests that this type of close collaboration has not yet been realized for most firms. However, this would certainly be a reasonable effort to target, but firms would need to become much more confident that they can trust their channel partners to work for the good of the supply chain and not engage in opportunistic behaviors. Since actions related to the resource-based view have not yet been widespread in practice, activities associated with the relational view (Dyer and Singh, 1998) are more of an ideal target than something that is actually happening in most situations. This would involve firms not only working together and focusing on their competencies, but establishing mutual goals, aligning incentives, and ensuring all decisions are synchronized for the good of the supply chain. This research has indicated that these more advanced collaborative initiatives are not common and the required trust between firms has not yet been established.

The foundations of the field of supply chain management are built on the premise that relationships between firms will be strong and mutually beneficial. This has evolved from a time when firms were at odds and usually working in the interest of their own gains. This evolution has led to the premise that firms no longer work alone,

but as a team with common goals. This development sees supply chains competing against one another to become more efficient and better serve customers for the good of all firms involved. However, this is not without conflict since some firms may benefit more than others and this can lead to conflicts within a supply chain.

By successfully utilizing collaboration and making improvements to their supply chain relationships, firms and supply chains have the opportunity to gain a competitive advantage over firms that are not properly utilizing a collaborative strategy. This will continue the evolution of the field of SCM and help firms reach the full potential of an integrated supply chain. By practicing SCM in a manner consistent with the definitions of organizations like the CSCMP, firms and supply chains will improve their own outcomes and ultimately better serve their customers.

3.5 Limitations

While every effort was made to follow established guidelines in this research in regards to critical issues like construct or survey development, it is in no way perfect and does suffer from weaknesses. This study only considers firms that are associated with the American Purchasing Society, the Supply Chain Management Association, or the consulting firm Supply Velocity. Therefore, the study may suffer from a regional bias since it is restricted primarily to North America. Since many of the relationships examined in this research had no more than a national or even regional scope, the study may also not reflect the true nature of supply chain relationships in today's global economy since partnerships that span numerous national boundaries are no longer

uncommon. In addition, this research is limited by the depth of information that can be captured by utilizing a survey as a primary methodological tool (Omar et al, 2012).

The analysis of the study also suffered from being unable to test for non-response bias. The professional organizations that participated had different desires for sending out multiple waves of survey invitations, so no consistency existed in able to compare respondents. To be specific, one organization preferred to only send out a single e-mail and the other was willing to send out multiple waves. The potential respondents were also completely anonymous since the organizations understandably were unable to share personal information, so calling non-respondents in order to compare them to respondents was not possible.

Another clear limitation to this study was the need for more respondents in order to increase the sample size. Due to a constrained budget for this study, e-mail was used as the sole means of distributing the survey to potential respondents. Kaplowitz et al (2004) found that conducting surveys on the web alone, or without supplemental mail reminders, led to the lowest response rate when compared to other methods, such as mail surveys. In addition, Sheehan (2001) claimed that the use of e-mail for surveys may be obsolete, and response rates to e-mail surveys have declined since the 1980s. Lastly, numerous sources indicate that e-mail open rates are quite low, ranging from the teens to roughly 30 percent. Thus, a majority of potential respondents do not even see the solicitation to participate in a survey, and only a small portion of those that see it follow through and participate. As a result, response rates for e-mail surveys may be doomed from the start.

3.6 Future Research

The research outlined above is in no way conclusive about the benefits or detriments of collaboration. It is simply one ingredient to numerous other examples of research that seek to better understand the strategy. Firms and professionals can use this research to understand where they stand in terms of using collaboration as a business strategy and in terms of how they compare with other firms and supply chains. Academics can use the study to gain a better understanding of where collaboration truly stands in the real world. The drive for innovation and race for publications has resulted in academia far outreaching industry with where collaboration is and should be, so this can aid researchers in knowing what is really happening rather than what will ideally happen in the perfect supply chain of the future.

Based on this research and previous literature on the topic, research opportunities on the subject of collaboration are numerous. The dimensions of collaboration are a key aspect of this work, but more needs to be done to understand their dynamics. What are the relationships between these different dimensions, as well as trust and commitment? Trust clearly enables initiatives like information sharing, but what other types of relationships and forms of apparent causation exist? Are these a one size fits all for all supply chains or does it vary? In addition, it would be beneficial to identify which of these dimensions are required to have successful collaboration.

Trust is an issue that requires additional research since collaborative relationships are unlikely to reach their full potential if firms do not trust each other. This research first considered trust as a factor that impacts performance and then a

factor that impacts collaboration, but different perspectives are warranted. For example, perhaps trust is moderating variable that may change the effect of collaboration on performance rather than directly impacting any factor. Previous literature and the claims made in the interviews of this research make it clear that trust is critical but not yet prevalent, so firms and supply chains need to be sure it is present.

An issue often related to trust in the supply chain collaboration literature is power. Nyaga et al (2013) note that relationships do exist where there is a power balance between partners, but a more common occurrence is for relationships to have a power imbalance. This can lead to the situation where one partner uses its power in an opportunistic way to gain more benefits (Sridharan and Simatupang, 2013). Since this clearly goes against the premise of collaboration, future research should identify the source of power imbalances and approaches to correct them.

This study was conducted during a period of global economic uncertainty. It may be more attractive to engage in relationships during periods of economic difficulty due to factors like reduced costs, or it may be less attractive due to issues like a fear of making a decision that could lead to a firm going out of business. Therefore, additional investigation may be warranted in the form of a future study.

In an effort to provide consistency in perspectives and make the results more meaningful, this research focused on the upstream portion of the supply chain by conducting interviews and surveying purchasing representatives at respondent firms. Future research could do the exact opposite. Investigating the opinions of only sales managers, or those that are involved with the downstream portion of a firm's supply

chain activities, could provide an alternative viewpoint that would supplement the results of this research. It may also be reasonable to investigate the opinions of both sides at the same time to see if their views conflict.

It was previously mentioned that Das et al (2006) have noted that there is evidence of diminishing returns to collaborative investments in supply chains. Why is this so? Is it possible to continually gauge and develop relationships in order to prevent these slowing returns and ensure a partnership or supply chain is at the forefront of innovation? Future research could create a framework for firms and supply chains to follow in order to keep their partnerships fresh and consistently profitable.

Other areas of interest for collaboration research would be to further investigate the strategy across different industries to see if there is a difference in its utilization. Perhaps some industries are at the forefront while others are lacking, or perhaps there is a unanimous struggle to implement collaboration. Also, it might be of benefit to compare the opinions of those at the top of a given organization (CXO) to those of lower level employees, such as a manager. If their views vary widely on the importance of collaboration and the state of collaboration in the firm and its supply chains, then it is clear there is a problem in the company associated with clearly noting the importance of the strategy. On a similar note, future research could utilize multiple respondents from each firm to avoid generalizing the opinions of one individual to an entire organization.

Lastly, several of the articles examined in the literature review of this research considered supply chain metrics. Are there metrics that can be utilized to gauge the success or failure of the total supply chain rather than just the individual firms involved

that have actually been taken beyond a theoretical stage and put into practice? This may make collaboration more understandable and attractive for firms that are seeking partnerships if they know there are effective measures of success. However, it will still be critical for each individual firm to be successful to please shareholders and enable continued operations.

References

Akintoye, Akintola, George McIntosh, and Eamon Fitzgerald (2000). "A survey of supply chain collaboration and management in the UK construction industry." *European Journal of Purchasing & Supply Management*, 6, 159-168.

Andraski, Joseph C. (1994). "Foundations for successful continuous replenishment programs." *International Journal of Logistics Management*, 5(1).

Angeles, Rebecca and Ravi Nath (2001). "Partner congruence in electronic data interchange (EDI) relationships." *Journal of Business Logistics*, 22(2), 109-127.

Bagchi, Prabir K., Byoung Chun Ha, Tage Skjoett-Larsen, and Lars Boege Soerensen (2005). "Supply chain integration: A European survey." *The International Journal of Logistics Management*, 16(2), 275-294.

Ballou, Ronald H. (2007). "The evolution and future of logistics and supply chain management." *European Business Review*, 19(4), 332-348.

Barratt, Mark (2004). "Understanding the meaning of collaboration in the supply chain." *Supply Chain Management*, 9(1), 30.

Barratt, Mark and Alexander Oliveira (2001). "Exploring the experiences of collaborative planning initiatives." *International Journal of Physical Distribution and Logistics Management*, 31(4).

Barratt, Mark and Adegoke Oke (2007). "Antecedents of supply chain visibility in retail supply chains: A resource-based theory perspective." *Journal of Operations Management*, 25(6), 1217-1233.

Beamon, Benita M. (1998). "Supply chain design and analysis: models and methods." *International Journal of Production Economics*, 55(3), 281-294.

Becker, Howard S. and Blanche Geer (1957). "Participant observation and interviewing: A comparison." *Human Organization*, 16(3), 28-32.

Bentler, P.M. (1990). "Comparative fit indexes in structural models." *Psychological Bulletin*, 107, 238-246.

Blau, P.M. (1964). *Exchange and power in social life*. New York: Wiley.

Bleeke, Joel and David Ernst (1993). *Collaborating to Compete*. New York: Wiley.

Bovel, D. and J. Martha (2000). "From supply chain to value net." *Journal of Strategic Management*, July-August, 24-28.

Brewer, Peter C. and Thomas W. Speh (2000). "Using the balanced scorecard to measure supply chain performance." *Journal of Business Logistics*, 21(1), 75-93.

Brunch, Niels J. (2008). *Introduction to Structural Equation Modeling Using SPSS and Amos*. SAGE Publications, London.

Burgess, Rachel (1998). "Avoiding supply chain management failure: lessons from business process re-engineering." *International Journal of Logistics Management*, 9(1), 15-23.

Cao, Mei and Qingyu Zhang (2011). "Supply chain collaboration: Impact on collaborative advantage and firm performance." *Journal of Operations Management*, 29, 163-180.

Childerhouse, Paul and Denis R. Towill (2003). "Simplified material flow holds the key to supply chain integration." *The International Journal of Management Science*, 31, 17-27.

Christopher, Martin (1997). *Marketing Logistics*, Butterworth-Heinemann, Oxford.

Christopher, Martin and Denis Towill (2001). "An integrated model for the design of agile supply chains." *International Journal of Physical Distribution & Logistics Management*, 31(4), 235-246.

Christopher, Martin and Uta Juttner (2000). "Developing strategic partnerships in the supply chain: a practitioner perspective." *European Journal of Purchasing and Supply Chain Management*, 6, 117-127.

Churchill, Gilbert A., Jr (1979). "A paradigm for developing better measures of marketing constructs." *Journal of Marketing Research*, 16(1).

Cooper, Martha C., Douglas M. Lambert, and Janus D. Pagh (1997). "Supply chain management: More than a new name for logistics." *The International Journal of Logistics Management*, 8(1), 1-13.

Council of Supply Chain Management Professionals (2012), available at www.cscmp.com

Croom, Simon (2001). "Restructuring supply chains through information channel innovation." *International Journal of Operations & Production Management*, 21(4), 504-515.

Das, A., R. Narasimhan, and S. Talluri (2006). "Supplier integration – finding an optimal configuration." *Journal of Operations Management*, 24(5), 563-582.

Daugherty, Patricia J., R. Glenn Richey, Anthony S. Roath, Soonhong Min, Haozhe Chen, Aaron D. Arndt, and Stegan E. Genchev (2006). "Is collaboration paying off for firms?" *Business Horizons*, 49, 61-70.

Dillman, Don A. (2000). *Mail and Internet Surveys*. New York: Wiley.

Duclos, Leslie K., Robert J. Vokurka, and Rhonda R. Lummus (2003). "A conceptual model of supply chain flexibility." *Industrial Management and Data Systems*, 103(6), 446-456.

Duschek, Stephen (2004). "Inter-firm resources and sustained competitive advantage." *Management Revue*, 15(1).

Dyer, Jeffrey H. (2000). *Collaborative advantage: Winning through extended enterprise supplier networks.* Oxford University Press, New York.

Dyer, Jeffry H. and Harbir Singh (1998). "The relational view: cooperative strategy and sources of interorganizational competitive advantage." *The Academy of Management Review*, 23(4), 660-679.

Eliashberg, J. and D.A. Michie (1984). "Interorganizational competitive advantage." *Academy of Management Review*, 23(4).

Fawcett, Stanley E. and Gregory M. Magnan (2002). "The rhetoric and reality of supply chain integration." *International Journal of Physical Distribution & Logistics Management*, 32(5), 339-361.

Fawcett, Stanley E., Amydee M. Fawcett, Bradlee J. Watson, and Gregory M. Magnan (2012). "Peeking inside the black box: Toward an understanding of supply chain collaboration dynamics." *Journal of Supply Chain Management*, 48(1), 44-72.

Fawcett, Stanley E., Gregory M. Magnan, and Matthew W. McCarter (2008). "Benefits, barriers, and bridges to effective supply chain management." *Supply Chain Management: An International Journal*, 13(1), 35-48.

Fawcett, Stanley E., Stephen L. Jones, and Amydee M. Fawcett (2012). "Supply chain trust: the catalyst for collaborative innovation." *Business Horizons*, 55(2), 163-178.

Fisher, Marshall L. (1997). "What is the right supply chain for your product?" *Harvard Business Review*, March-April 1997, 105-116.

Flynn, Barbara B., Baofeng Huo, and Xiande Zhao (2010). "The impact of supply chain integration on performance: A contingency and configuration approach." *Journal of Operations Management*, 28(1), 58-71.

Flynn, Barbara B., Sadao Sakakibara, and Roger G. Schroeder (1995). "Relationship between JIT and TQM: practices and performance." *Academy of Management Journal*, 38(5), 1325-1360.

Flynn, Barbara B., Sadao Sakakibara, Roger G. Schroeder, Kimberly A. Bates, and E. James Flynn (1990). "Empirical research methods in operations management." *Journal of Operations Management*, 9(2), 250-284.

Fontanella, John and Robert E. Sabath (2002). "The unfulfilled promise of supply chain collaboration." *Supply Chain Management Review,* 6(4), 24-29.

Frohlich, Markham T. and Roy Westbrook (2001). "Arcs of integration: an international study of supply chain strategies." *Journal of Operations Management*, 19(2), 185-200.

Gioia, Dennis A. and Evelyn Pitre (1990). "Multiparadigm perspectives on theory building." *The Academy of Management Review*, 15(4), 584-602.

Goffin, Keith, Fred Lemke, and Marek Szwejczewsku (2006). "An exploratory study of 'close' supplier-manufacturer relationships." *Journal of Operations Management*, 24(2), 189-209.

Golicic, Susan L., Donna F. Davis, Teresa M. McCarthy, and John T. Mentzer (2002). "The impact of e-commerce on supply chain relationships." *International Journal of Physical Distribution & Logistics Management*, 22(10), 851-871.

Grieger, Martin (2003). "Electronic marketplaces: A literature review and a call for supply chain management research." *European Journal of Operational Research*, 144, 280-294.

Gunasekaran, A. and E.W.T. Ngai (2004). "Information systems in supply chain integration and management." *European Journal of Operational Research*, 159, 269-295.

Gunasekaran, A., C. Patel, and Ronald E. McGaughey (2004). "A framework for supply chain performance measurement." *International Journal of Production Economics,* 87, 333-347.

Harland, Christine, Jurong Zheng, Thomas Johnsen, and Richard Lamming (2004). "A conceptual model for researching the creation and operation of supply networks." *British Journal of Management*, 15(1), 1-21.

Holweg, Matthias, Stephen Disney, Jan Holmstrom, and Johanna Smaros (2005). "Supply chain collaboration: making sense of the strategy continuum." *European Management Journal,* 23(2), 170-181.

Hsu, Maxwell K. (2010). "Structural equation modeling with IBM SPSS Amos: A methodology for predicting behavioral intentions in the services sector." *IBM Software Business Analytics*. Retreived from http://public.dhe.ibm.com/common/ssi/ecm/en/ytw03074usen/YTW03074USEN.PDF.

James, J.M. and R. Bolstein (1992). "Large monetary incentives and their effect on mail survey response rates." *Public Opinion Quarterly*, 56, 442-453.

Jap, Sandy D. (1999). "Pie-expansion efforts: Collaboration processes in buyer-supplier relationships." *Journal of Marketing Research*, 36(4).

Jap, Sandy D. (2001). "Perspectives on joint competitive advantages in buyer-supplier relationships." *International Journal of Research in Marketing*, 18(2).

Johnson, Jean L. and Ravipreet S. Sohi (2003). "The development of interfirm partnering competence: platforms for learning, learning activities, and consequences of learning." *Journal of Business Research*, 56(9), 757-766.

Johnston, David A, David M McCutcheon, F. Ian Stuart, and Hazel Kerwood (2004). "Effects of supplier trust on performance of cooperative supplier relationships." *Journal of Operations Management*, 22(1), 23-38.

Kalwani, Manohar U. and Narakesari Narayandas (1995). "Long-term manufacturer-supplier relationships: do they pay off for supplier firms?" *Journal of Marketing*, 59, 1-16.

Kanter, Rosabeth Moss (1994). "Collaborative advantage: the art of alliances." *Harvard Business Review*, 72(4).

Kaplowitz, Michael D., Timothy D. Hadlock, and Ralph Levine (2004). "A comparison of web and mail survey response rates." *Public Opinion Quarterly*, 68(1), 94-101.

Kaufman, Allen, Craig H. Wood, and Gregory Theyel (2000). "Collaboration and technology linkages: a strategic supplier typology." *Strategic Management Journal*, 21(6), 649-663.

Koh, Jeongsuk and N. Venkatraman (1991). "Joint venture formations and stock market reactions: an assessment in the information technology sector." *Academy of Management Journal 34(4), 869-892.*

Lambert, Douglas M. and Martha C. Cooper (2000). "Issues in supply chain management." *Industrial Marketing Management*, 29, 65-83.

Lambert, Douglas M., Martha C. Cooper, and Janue D. Pagh (1998). "Supply chain management: implementation issues and research opportunities." *International Journal of Logistics Management*, 9(2), 1-18.

Lancioni, Richard A. (2000). "New developments in supply chain management for the millennium." *Industrial Marketing Management*, 29, 1-6.

Lee, Hau L. (2004). "The Triple-A Supply Chain." *Harvard Business Review*, 82(10) 102-112.

Lee, Hau L. and Seungjin Whang (2001). "E-business and supply chain integration." *SGSCMF-W2-2001*.

Lee, Hau L., V. Padmanabhan, and Seungjin Whang (1997). "Information distortion in a supply chain: the bullwhip effect." *Management Science*, 43(4), 546-558.

Lee, Hau L., V. Padmanabhan, and Seungjin Whang (1997). "The bullwhip effect in supply chains." *Sloan Management Review*, 38(3), 93-102.

Leeuw, Sander de and Jan Fransoo (2009). "Drivers of close supply chain collaboration: one size fits all?" *International Journal of Production and Operations Management*, 29(7), 720-739.

Lejeune, Miguel A. and Nevena Yakova (2005). "On characterizing the 4 C's in supply chain management." *Journal of Operations Management*, 23(1).

Li, Suhong, Bhanu Ragu-Nathan, T.S. Ragu-Nathan, and S. Subba Rao (2006). "The impact of supply chain management practices on competitive advantage and organizational performance." *Omega*, 34, 107-124.

Liker, Jeffrey K. and Thomas Y. Choi (2006). "Building deep supplier relationships." *Harvard Business Review on Supply Chain Management*, 82(10), 102-112.

Lummus, Rhonda R. and Robert J. Vokurka (1999). "Defining supply chain management: a historical perspective and practical guidelines." *Industrial Management & Data Systems*, 99(1), 11-17.

Malhotra, Arvind, Sanjay Gosain, and Omar A. El Sawy (2005). "Absorptive capacity configurations in supply chains: gearing for partner-enabled market knowledge creation." *MIS Quarterly*, 29(1), 145-187.

Mangan, John, Chandra Lalwani, and Bernard Gardner (2004). "Combining quantitative and qualitative methodologies in logistics research." *International Journal of Physical Distribution& Logistics Management*, 34(7).

Manthou, Vicky, Maro Vlachopoulou, and Dimitris Folinas (2004). "Virtual e-chain (VeC) model for supply chain collaboration." *International Journal of Production Economics*, 87(3), 241-250.

McHugh, Marie, Paul Humphreys, and Ronan McIvor (2003). "Buyer-supplier relationships and organizational health." *The Journal of Supply Chain Management*, 39(2), 15-25.

McCraken, G.D. (1988). *The Long Interview*. Sage Publications, Newbury Park, CA.

Mentzer, John T., Theodore P. Stank, and Matthew B. Myers (2006). "Why Global Supply Chain Management?" *Handbook of Global Supply Chain Management.* Sage Publications.

Mentzer, John T., William DeWitt, James S. Keebler, Soonhong Min, Nancy W. Nix, Carlo D. Smith, and Zach G. Zacharia (2001). "Defining supply chain management." *Journal of Business Logistics*, 22(2).

Min, Hokey and Gengui Zhou (2002). "Supply chain modeling: past, present and future." *Computers & Industrial Engineering*, 43, 231-249.

Min, Soonhong and John T. Mentzer (2004). "Developing and measuring supply chain management concepts." *Journal of Business Logistics*, 25(1).

Min, Soonhong, Anthony S. Roath, Patricia J. Daugherty, Stefan E. Genchev, Haozhe Chen, Aaron D. Arndt, R. Glenn Richey (2005). "Supply chain collaboration: What's happening?" *International Journal of Logistics Management*, 16(2), 237-256.

Mingers, J. (2003). "A classification of the philosophical assumptions of management science methods." *The Journal of the Operational Research Society*, 54(6).

Mohr, Jakki J., Robert J. Fisher, and John R. Nevin (1996). "Collaborative communication in interfirm relationships: Moderating effects of integration and control." *Journal of Marketing*, 60(3).

Monczka, Robert M., Kenneth J. Petersen, Robert B. Handfield, and Gary L. Ragatz (1998). "Success factors in strategic supplier alliances: the buying company perspective." *Decision Sciences*, 29(3), 15-30.

Myers, Matthew B. and Mee Shew Cheung (2008), "Sharing Global Supply Chain Knowledge." *Sloan Management Review*, 49 (Summer), 67-73.

New, S.J and P. Payne (1995). "Research frameworks in logistics: three models, seven dinners and a survey." *International Journal of Physical Distribution and Logistics Management*, 25(10), 60-77.

Nunnally, Jum C. (1967). *Psychometric Theory*. McGraw-Hill, New York.

Nyaga, Gilbert N., Daniel F. Lynch, Donna Marshall, and Eamonn Ambrose (2013). "Power Asymmetry, Adaptation and Collaboration in Dyadic Relationships Involving a Powerful Partner." *Journal of Supply Chain Management*, 49(3), 42-65.

Nyaga, Gilbert N., Judith M. Whipple, and Daniel F. Lynch (2010). "Examining supply chain relationships: do buyer and supplier perspectives on collaborative relationships differ?" *Journal of Operations Management*, 28(2), 101-114.

Omar, Ayman, Beth Davis-Sramek, Matthew B. Myers, and John T. Mentzer (2012). "A global analysis of orientation, coordination, and flexibility in supply chains." *Journal of Business Logistics*, 33(2), 128-144.

Pinsonneault, A. and K.L. Kraemer (1993). "Survey research methodology in management information systems: an assessment." *Journal of Management Information Systems*, 10(2), 75-105.

Porter, Michael E. (1985). "Technology and competitive advantage." *Journal of Business Strategy*, 5(3), 60-78.

Powell, Walter W. (1998). "Learning from collaboration: knowledge and networks in the biotechnology and pharmaceutical industries." *California Management Review*, 40(3).

Prahinski, Carol and W.C. Benton (2004). "Supplier evaluations: communication strategies to improve supplier performance." *Journal of Operations Management*, 22(1), 39-62.

Ramanathan, Usha and Angappa Gunasekaran (2014). "Supply chain collaboration: impact of success in long-term partnerships." *International Journal of Production Economics*, 147(2), 252-259.

Rogers, Everett (1962). *Diffusion of Innovations*. New York: Free Press.

Sahay, B.S. (2003). "Supply chain collaboration: the key to value creation." *Work Study,* 52(2), 76-83.

Sahay, B.S. (2003). "Understanding trust in supply chain relationships." *Industrial Management and Data Systems*, 103(8), 553-563.

Sample Consent Form (2007). Available at http://www.irb.cornell.edu/forms/sample.htm.

Sample Survey Cover Letter. Available at http://www.global.cmich.edu/forms/Sample-Survey-Cover-Letter.pdf.

Seidman, Irving (1998). *Interviewing as Qualitative Research*. New York: Teachers College Press.

Sheehan, Kim Bartel (2001). "E-mail survey response rates: a review." *Journal of Computer-Mediated Communication*, 6(2).

Sheu, Chwen, HsiuJu Rebecca Yen, and Bongsug Chae (2006). "Determinants of supplier-retailer collaboration: evidence from an international study." *International Journal of Operations and Production Management*, 26(1), 24-49.

Simatupang, Togar M. and Ramaswami Sridharan (2002). "The collaborative supply chain." *The International Journal of Logistics Management*, 13(1), 15-30.

Simatupang, Togar M. and Ramaswami Sridharan (2004). "Benchmarking supply chain collaboration: an empirical study." *Benchmarking: An International Journal*, 11(5).

Simatupang, Togar M. and Ramaswami Sridharan (2005). "An integrative framework for supply chain collaboration." *International Journal of Logistics Management*, 16(2), 257-274.

Simatupang, Togar M. and Ramaswami Sridharan (2005). "The collaboration index: a measure for supply chain collaboration." *International Journal of Physical Distribution and Logistics Management*, 35(1).

Simchi-Levi, David, Philip Kaminsky, Edith Simchi-Levi, and Ravi Shankar (2008). *Designing and Managing the Supply Chain*. Third Edition. McGraw-Hill.

Soosay, Claudine A., Paul W. Hyland, and Mario Ferrer (2008). "Supply chain collaboration: capabilities for continuous innovation." *Supply Chain Management: An International Journal*, 13(2), 160-169.

Spekman, Robert E., John W. Kamauff, Jr. and Niklas Myhr (1998). "An empirical investigation into supply chain management: a perspective on partnerships." *Supply Chain Management*, 3(2), 53-67.

Sridharan, Ramaswami and Togar M. Simatupang (2013). "Power and trust in supply chain collaboration." *International Journal of Value Chain Management*, 7(1), 76-96.

Stank, Theodore P., Scott B. Keller, and Patricia J. Daugherty (2001). "Supply chain collaboration and logistical service performance." *Journal of Business Logistics*, 22(1), 29-48.

Stuart, F.I. (1997). "Supplier alliance success and failure: a longitudinal dyadic perspective." *International Journal of Production and Operations Management*, 17(6), 539-557.

Suddaby, Roy (2006). "From the editors: what grounded theory is not." *Academy of Management Journal*, 49(4), 633-642.

Tan, Keah Choon (2001a). "A framework of supply chain management literature." *European Journal of Purchasing and Supply Management*, 7, 39-48.

Tan, Keah Choon (2001b). "A structural equation model of new product design and development." *Decision Sciences*, 32(2), 195-226.

The Consumer Goods Forum, Capgemini, HP, Microsoft (2011). 2020 Future Value Chain: Building Strategies for the New Decade. Available at http://www.futurevaluechain.com/

Thibaut, J.W. and H.H. Kelley (1959). *The social psychology of groups*. New York: Wiley.

Trow, M. (1957). Comment on "Participant observation and interviewing: A comparison." *Human Organization*, 16(3), 33-35.

Tuten, Tracy L. and David J. Urban (2001). "An expanded model of business-to-business partnership foundation and success." *Industrial Marketing Management*, 30(2), 149-164.

Whipple, Judith M. and Dawn Russell (2002). "Building supply chain collaboration: a typology of collaborative approaches." *The International Journal of Logistics Management*, 18(2), 174-196.

Wiker, J., D.R. Towill, and M. Naim (1991). "Smoothing supply chain dynamics." *International Journal of Production Economics*, 22(3), 231-248.

Yauch, Charlene A. and Harold J. Steudel (2003). "Complementary use of qualitative and quantitative cultural assessment methods." *Organizational Research Methods*, 6(4), 465-481.

Zhao, Xiande, Baofeng Huo, Barbara B. Flynn, Jeff Hoi Yan Yeung (2008). "The impact of power and relationship commitment on the integration between manufacturers and customers in a supply chain." *Journal of Operations Management*, 26(3), 368-388.

Appendix

Summary of Published Research on Relationships and Collaboration

Publication (author(s), year)	Data Sources and Analytical Techniques	Issues Addressed	Major Findings
Kalwani and Narayandas, 1995	The authors used data available in the Compustat collection of databases and the Compact Disclosure data base and compared the matched pair Wilcoxson Signed Rank Test to evaluate differences.	Investigated whether or not tying up with specific customers could have a negative impact on the performance of a supplier firm.	Maintaining long-term relationships with customers does not hurt sales and servicing few customers can reduce both inventory and discretionary costs.
Spekman et al, 1998	Administered a questionnaire to numerous global firms in a broad range of industries and did t-tests to see their differences.	Investigated various supply chain issues as reported by the surveyed firms, including issues related to relationships.	Managers typically acknowledged the importance of collaboration, but actions were still oriented towards their individual company rather than the supply chain.
Lambert et al, 1998	The authors utilized a framework suggested by Cooper et al, 1997.	Illustrated numerous supply chain concepts by using and expanding upon the framework.	Successful SCM requires integrating business processes with key members of the supply chain.
Christopher and Juttner, 2000	Focus groups at a major logistics conference and case studies.	Described practices in numerous industries regarding managing supply chain relationships.	The resulting farmework should help practitioners in the application and development of supply chain relationships.
Fawcett and Magnan, 2002	Survey of members of the National Association of Purchasing Management, the Council of Logistics Management, and the American Production and Inventory Control Society, and 52 case study interviews of firms in various echelons of their supply chains.	Attempted to obtain an accurate view of SCM as it is actually practiced.	Findings showed that SC practices are rarely consistent with the theoretical ideal. Tension exists between the potential of SCM and the difficulty of implementing collaboration.
Whipple and Russell, 2002	In-depth interviews of 21 supply chain management managers from 10 different firms	Examines issues related to collaborative relationships and develops a typology of collaborative approaches	Three main collaborative approaches are proposed, including transaction management, event management, and process management, that managers can use in their existing and future relationships.
Childerhouse and Towill, 2003	Statistically analyzed 32 industrial case studies.	Showed that the route to a fully integrated supply chain has already been established.	Effectiveness of a supply chain can be determined by assessing levels of uncertainty within it.
Sahay, 2003	Feedback from 160 Indian firms.	Explored the level of involvement of supply chain customers and suppliers across different processes and sectors.	Processes that are important to suppliers are not always important to customers. Partners must cooperate together to reap the benefits of collaboration.

Summary of Published Research on Collaboration			
Publication (author(s), year)	Data Sources and Analytical Techniques	Issues Addressed	Major Findings
Gunasekaran et al, 2004	Survey of 150 large firms in the UK and previous literature.	Created a framework to lead to a better understanding of supply chain performance measurement and metrics.	A proactive approach to contemporary supply chain management practices like collaboration can lead to improved outcomes.
Simaputang and Sridharan, 2004	Survey of firms listed in various trade databases, such as *The New England Business Directory* .	Conducted a benchmarking study that measures the level of collaborative practices and how that impacts operational performance between retailers and suppliers.	Firms engage in collaboration for a wide range of reasons, such as for increasing sales or improving forecasting. Supply chains can see higher levels of performance based on the level of collaborative practice they undertake.
Sheu et al, 2006	Structured interviews in a field setting.	Developed a supplier-relationship model that recognized several variables that were found to be relevant to relationships external to a given organization	Collaboration improves performance between supply chain partners.
Myers and Cheung, 2008	Survey of five partner companies of the University of Tennessee and their suppliers.	Developed a better understanding of sharing global supply chain knowledge.	Knowledge sharing is critical to the success of a supply chain.
Leeuw and Fransoo, 2009	Previous literature and case studies in the electronics, fashion, and consumer packaged goods industries.	Determined the drivers of close supply chain collaboration.	Collaborative efforts are usually aimed towards suppliers and collaboration can lead to both parties waiting on the other to improve and doing nothing.
Fawcett et al, 2012	Structured interviews at each of two points in time.	Developed a theoretical model to explain collaboration successes and failures.	Traditional firm structures and cultures may inhibit collaboration, but managerial commitment can help to overcome the difficulties. Successful collaborations may lead to future successful collaborations.
Ramanathan and Gunasekaran, 2014	A survey of textile firms that was analyzed utilizing a structural model.	Identified the influcence of collaborative factors on the success of collaboration.	Collaborative planning, collaborative decision making, and collaborative execution do impact collaboration success, and this may be a factor that leads firms to continue to engage in the relationships.

Interview Guide

How do you define supply chain management?

How do you define supply chain collaboration?

How is your firm involved with collaborative relationships with your suppliers?

Why is your firm involved with collaborative relationships with your suppliers?

How does your firm evaluate and select suppliers?

How do your firm's relationships with suppliers differ? Are some more important than others are they all treated the same?

How are your supplier relationships formalized (formal partnerships, contracts, verbal agreements, etc)?

What do you think the most critical aspect of collaboration is? In other words, what do you think are the key ingredients of your firm's relationships with suppliers?

In what ways does your firm work with suppliers?

What kinds of linkages does your firm have with suppliers?

What activities are done jointly between your firm and suppliers?

How are problems solved between your firm and its suppliers?

How do the relationships your firm has with suppliers vary in their intensity?

How have your firm's collaborative relationships with suppliers changed over time?

What are some major barriers your firm experiences with supplier relationships?

What benefits have resulted from your firm's relationships with suppliers?

How does your firm determine the success or failure of its supplier relationships?

Transactional Theory
How does your firm share information with suppliers?
Are there open lines of communication between your firm and suppliers?
Is this communication formal, informal, or both?

Relational Theory
Does your firm focus on its own goals or does your firm focus on shared goals with suppliers?
Does one firm set these goals or do firms work together to establish them?
Does your firm and its suppliers work together to solve problems jointly?
Does your firm work with suppliers to plan activities? This can include production, transportation, warehousing, etc.

Resource-based Theory
Does your firm have specific personnel dedicated to collaborative efforts with suppliers?
Does your firm share resources with suppliers, such as equipment, personnel, or facilities?

Commitment
How is your firm committed to the relationship established with suppliers?

Trust
Why does your firm trust its suppliers?

Interview Consent Form

(Adapted from Sample Consent Form, Cornell University)

You are being asked to participate in a research study of the extent of collaboration practices of firms and supply chains around the globe. You have been selected for this study since you indicated in a previous survey that you would be interested in participating. Please read this form carefully and ask any questions you may have before agreeing to take part in the study.

What the study is about: The purpose of this study is to learn about the extent that global firms and supply chains actually practice the concept of supply chain collaboration.

What we will ask you to do: If you agree to be in this study, I will conduct an interview with you. The interview will include questions about the concept of collaboration and how or why you and your firm participate in it. The interview will take about 30 minutes to complete. With your permission, we would also like to record the interview.

Risks and benefits: There is the risk that you may find some of the questions about your job conditions to be sensitive. However, I do not anticipate any risks to you participating in this study other than those encountered in day-to-day life.

There are no direct benefits to you, but do know that your input is very valuable to the research at hand.

Your answers will be confidential. The records of this study will be kept private. In any sort of report or article that is made public I will not include any information that will make it possible to identify you or your firm. Research records will be kept in a locked file; only my dissertation committee and I will have access to the records. If I record the interview, I will destroy the recording after it has been transcribed, which I anticipate will be within two months of the interview.

Taking part is voluntary: Taking part in this study is completely voluntary. You may skip any questions that you do not want to answer or terminate an interview at any time. If you decide to take part, you are free to withdraw at any time.

If you have questions: The researcher conducting this study is Wesley Boyce. Please ask any questions you have now. If you have questions later, you may contact Wesley at wesley.boyce@mail.umsl.edu or 314-803-1782. You will be given a copy of this form to keep for your records.

Statement of Consent: I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

_____ _____

Participant's signature Date

_____

Interviewer's signature

Survey Instrument

Introduction

This is a survey on collaboration practices of North American firms from the perspective of the purchasing function. All information obtained from the survey will remain confidential and your participation is voluntary. Please work at your own pace and do your best to answer all questions.
For the purposes of this study, a collaborative relationship is one where firms work closely together and may practice initiatives like information sharing, shared processes, integrated information systems, mutual product development, etc. It is based on the premise that firms no longer compete in isolation and must establish partnerships with external firms to remain successful. In other words, supply chains compete rather than individual firms.

Survey

General Purchasing Questions (Adapted from Akintoye et al, 2000)

1. Does your firm have a formal agreement in place with one or more of its suppliers?
   - Yes or no
   - If yes, please specify what kind of agreement is in place (contract, verbal, trust, etc)

2. How long has the average contractual agreement with a supplier been in place for your organization?
   - No agreement
   - 1-2 years
   - 3-5 years
   - 6-10 years
   - Over 10 years

3. How important is supply chain management and collaboration to you and your firm?
   - Not important
   - Limited importance
   - Important
   - Critical

4. On a scale of 1-5, please indicate the importance of each of the following functions for your firm's SCM goals to be accomplished?
   - Production planning
   - Purchasing
   - Transportation
   - Storage
   - Inventory

5. On a scale of 1-5, with 1 being not at all important and 5 being extremely important, please indicate how important each of the following factors are in your supplier relationships:

- Better quality service
- Cost benefits
- Simplifying the purchasing process
- Simplifying your firm's overall processes

6. On a scale of 1-5, please indicate the importance of each of the following objectives in your firm's supplier relationships:

- Benefits to the supplier
- Benefits to your firm
- Cost reductions for the overall supply chain
- Cost reductions within your firm
- Improved quality assurance
- Increased market competitiveness
- Increased profitability
- Reducing bureaucracy/paperwork

7. On a scale of 1-5, please indicate the importance of each of the following factors in your supplier relationships:

- Closer links between demand/supply
- Free flow of information
- Integrated information systems
- Joint business planning
- Manpower development
- More frequent meetings
- Mutual interest
- Reliability of supply
- Top management support
- Trust

8. On a scale of 1-5, please indicate the extent that each of the following factors hinders your supplier relationships:

- Inappropriate organization structure to support the system
- Lack of appropriate information technology
- Lack of top management commitment
- Low commitment of supplier partners
- Poor undertaking of the concept of SCM
- Strategic benefits unclear

Hypothesis 1

These questions all relate to the Supply Chain Management Continuum (Figure 3).

9A: My firm is open when dealing with suppliers (Min and Mentzer, 2004). Likert scale 1 (strongly disagree) to 5 (strongly agree).

9B: My firm is willing to make cooperative changes with its suppliers (Cannon and Perreault, 1999; Min and Mentzer, 2004). Likert scale 1 (strongly disagree) to 5 (strongly agree).

9C: My firm believes it must work together with its suppliers to be successful (Cannon and Perreault, 1999; Min and Mentzer, 2004). Likert scale 1 (strongly disagree) to 5 (strongly agree).

9D: My firm's goals and objectives are consistent with those of its suppliers (Bucklin and Sengupta, 1993; Min and Mentzer, 2004). Likert scale 1 (strongly disagree) to 5 (strongly agree).

9E: My firm and its suppliers practice electronic data interchange (EDI) (Min and Mentzer, 2004). Likert scale 1 (strongly disagree) to 5 (strongly agree).

9F: My firm integrates operations with its suppliers by interlocking programs and activities (Min and Mentzer, 2004). Likert scale 1 (strongly disagree) to 5 (strongly agree).

9G: My business and its suppliers have a strong and long-term relationship fostering cooperation with each other (Min and Mentzer, 2004). Likert scale 1 (strongly disagree) to 5 (strongly agree).

9H: My business does not base its supplier relationships primarily on price.

9I: My firm does not have a combative relationship with one or more suppliers.

9J: How important is collaboration to your firm? (1 = not at all, 5 = extremely)

Hypotheses 2 and 3 – Dimensions of Collaboration

Information Sharing

10: My firm and its suppliers share information in the following ways (Monczka et al, 1998; Angeles and Nath, 2001):
Timely
Accurate
Complete
Adequate
Credible

11: My firm and its suppliers frequently share information (Angeles and Nath, 2001).
12: My firm and its suppliers share proprietary information (Monczka et al, 1998).
13: It is important for my firm to practice information sharing with its suppliers.

Decision Synchronization

14: My firm and its suppliers work together to solve problems jointly (Monczka et al, 1998; Li et al, 2006, Das et al, 2006).
15: My firm includes suppliers in the new product development process (Li et al, 2006, Zhao et al, 2008, Flynn et al, 2010).
16: My firm and its suppliers jointly make production plans (Frohlich and Westbrook, 2001).
17: My firm and its suppliers jointly work on demand planning (Zhao et al, 2008, Flynn et al, 2010).
18: My firm and its suppliers jointly work on inventory management (Frohlich and Westbrook, 2001; Zhao et al, 2008, Flynn et al, 2010).
19: My firm and its suppliers share point-of-sale data (Flynn et al, 2010).
20: My firm and its suppliers frequently synchronize decision making.
21: It is important for my firm to practice decision synchronization with its suppliers.

Incentive Alignment

22: My firm and its suppliers use joint formal evaluation and feedback procedures (Das et al, 2006).
23: My firm and its suppliers use a joint reward system (Das et al, 2006).
24: My firm and its suppliers share costs, benefits, and risks (Das et al, 2006; Cao and Zhang, 2011).
25: The rewards my firm can reap from our relationships are equitable to the degree of risk and investment it has invested in those relationships (Cao and Zhang, 2011).
26: My firm and its suppliers frequently align incentives.
27: It is important for my firm to practice incentive alignment with its suppliers.

Collaborative Communication

28: My firm and supply chain partners have frequent contacts on a regular basis.
29: My firm and supply chain partners have open and two-way communication.
30: My firm and supply chain partners have informal communication.
31: My firm and supply chain partners have many different channels to communicate.
32: My firm and supply chain partners influence each other's decisions through discussion rather than request.
33: My firm and its suppliers frequently communicate collaboratively.
34: It is important for my firm to practice collaborative communication with its suppliers.

Hypothesis 4 – Performance Improvement (adapted from Baqchi et al, 2005)

35. Please estimate your improvement in performance in the following dimensions after participating in close supply chain relationships (1 – deteriorated to 5- improved).

- Order fulfillment lead time
- Order fill rate
- Supplier flexibility
- Rate of returns
- Inventory days of supply/inventory turnover rate
- On-time delivery

Hypothesis 5 – Trust (Johnston et al, 2004)

36: My firm feels that it is important not to use proprietary information to our suppliers' disadvantage.
37: A characteristic of my firm's supplier relationships is that neither party is expected to make demands that might be damaging to the other.
38: My firm has strong personal confidence in its supplier representatives.
39: My firm has strong business confidence in its suppliers.
40: My firm can rely on its suppliers when it counts.

Descriptive Statistics

41. What category most closely describes the main role of your current or most recent company (Simatupang and Sridharan, 2004)?

- Distributor
- Manufacturer
- Professional Services
- Public
- Retailer

42. How large is your firm, or how many employees work at your firm (Walts, 1980; Simatupang and Sridharan, 2004)?
- Less than 50
- 51-100
- 101-200
- 201-500
- More than 500

43. What is your firm's annual sales volume in millions of dollars?
- Under 100
- 100-250
- 250 or greater

44. What is your firm's annual purchasing volume in millions of dollars?
- Under 100
- 100-250
- 250 or greater

45. Which category best describes your current or most recent position and/or title (Akintoye et al, 2000)?
- Assistant (Director, Manager, etc)
- Buyer
- Chairman
- Chief Executive
- Director
- Managerial
- Researcher
- Other (please describe)

46. How long have you worked at your organization?
- Under 2 years
- 2-5 years
- 6-10 years
- Over 10 years

47. What sector are you in?
- Government
- Private

48. Are you a member of a professional organization (ie APICS, CSCMP, American Purchasing Society, etc)?

- American Purchasing Society
- APICS
- CSCMP
- NIGP
- NPI
- Other (please list)

Survey Cover Letter

(Adapted from Sample Survey Cover Letter, Central Michigan University)

January 1, 2014

Dear Participant:

My name is Wesley Boyce and I am a PhD candidate at the University of Missouri – St. Louis. For my dissertation, I am examining collaboration from the perspective of the purchasing function. Because you are involved in purchasing and a member of the American Purchasing Society, I am inviting you to participate in this research study by completing the survey at the included link.

The following questionnaire will require approximately 15 minutes to complete. There is no compensation for responding nor is there any known risk. If you choose to participate in
this project, please answer all questions as honestly as possible and complete the survey by January 31, 2014. Participation is strictly voluntary and you may refuse to participate at any time. All information provided in the survey will remain confidential.

Thank you for taking the time to assist me in my educational endeavors. Your efforts are greatly appreciated. The data collected will provide useful information regarding the present state of supply chain collaboration. If you require additional information or have questions, please contact me at the information listed below.

Sincerely,

Wesley Boyce
wesley.boyce@mail.umsl.edu

IRB Approval Letter

Office of Research Administration

One University Boulevard
St. Louis, Missouri 63121-4499
Telephone: 314-516-5899
Fax: 314-516-6759
E-mail: ora@umsl.edu

DATE:	July 9, 2013
TO:	Wesley Boyce
FROM:	University of Missouri-St. Louis IRB
PROJECT TITLE:	[488570-1] Supply Chain Relationships: Is Collaboration Reality?
REFERENCE #:	
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	July 9, 2013
REVIEW CATEGORY:	Exemption category # 2

The chairperson of the University of Missouri-St. Louis IRB has APPROVED has reviewed the above mentioned protocol for research involving human subjects and determined that the project qualifies for exemption from full committee review under Title 45 Code of Federal Regulations Part 46.101b. The time period for this approval expires one year from the date listed above. You must notify the University of Missouri-St. Louis IRB in advance of any proposed major changes in your approved protocol, e.g., addition of research sites or research instruments.

You must file an annual report with the committee. This report must indicate the starting date of the project and the number of subjects to date from start of project, or since last annual report, whichever is more recent.

Any consent or assent forms must be signed in duplicate and a copy provided to the subject. The principal investigator must retain the other copy of the signed consent form for at least three years following the completion of the research activity and they must be available for inspection if there is an official review of the UM-St. Louis human subjects research proceedings by the U.S. Department of Health and Human Services Office for Protection from Research Risks.

This action is officially recorded in the minutes of the committee.

If you have any questions, please contact Carl Bassi at 314-516-6029 or bassi@umsl.edu. Please include your project title and reference number in all correspondence with this committee.

SPSS Amos Output For Structural Model

Composite Model 1

Title

Composite model 1

Groups

Group number 1 (Group number 1)

Notes for Group (Group number 1)

The model is recursive.
Sample size = 86

Variable Summary (Group number 1)

Your model contains the following variables (Group number 1)

Observed, endogenous variables
CollComComposite
IncentComposite
DecisComposite
InfoComposite
TrustComposite
PerfComposite
CollComposite
Unobserved, endogenous variables
Collaboration
ImprovedPerformance
Unobserved, exogenous variables
InformationSharing
CollaborativeCommunication
DecisionSynchronization
incentiveAlignment
Trust
d1
d2
eCC
eIA
eDS
eIS
eT
eIP
eC

Variable counts (Group number 1)

Number of variables in your model:	23
Number of observed variables:	7
Number of unobserved variables:	16
Number of exogenous variables:	14
Number of endogenous variables:	9

Parameter Summary (Group number 1)

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	16	0	7	0	0	23
Labeled	0	0	0	0	0	0
Unlabeled	6	10	7	0	7	30
Total	22	10	14	0	7	53

Models

Default model (Default model)

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments:	35
Number of distinct parameters to be estimated:	30
Degrees of freedom (35 - 30):	5

Result (Default model)

Minimum was achieved
Chi-square = 11.669
Degrees of freedom = 5
Probability level = .040

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Collaboration	<---	InformationSharing	.458	.098	4.663	***	
Collaboration	<---	CollaborativeCommunication	.080	.124	.648	.517	
Collaboration	<---	DecisionSynchronization	.215	.132	1.629	.103	
Collaboration	<---	incentiveAlignment	.065	.117	.558	.577	
ImprovedPerformance	<---	Collaboration	.291	.100	2.912	.004	
ImprovedPerformance	<---	Trust	.058	.094	.614	.539	
CollComComposite	<---	CollaborativeCommunication	1.000				
IncentComposite	<---	incentiveAlignment	1.000				
DecisComposite	<---	DecisionSynchronization	1.000				
InfoComposite	<---	InformationSharing	1.000				
TrustComposite	<---	Trust	1.000				
PerfComposite	<---	ImprovedPerformance	1.000				
CollComposite	<---	Collaboration	1.000				

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Collaboration	<---	InformationSharing	.452
Collaboration	<---	CollaborativeCommunication	.080
Collaboration	<---	DecisionSynchronization	.214
Collaboration	<---	incentiveAlignment	.068
ImprovedPerformance	<---	Collaboration	.331
ImprovedPerformance	<---	Trust	.070
CollComComposite	<---	CollaborativeCommunication	1.000
IncentComposite	<---	incentiveAlignment	1.000
DecisComposite	<---	DecisionSynchronization	1.000
InfoComposite	<---	InformationSharing	1.000
TrustComposite	<---	Trust	1.000
PerfComposite	<---	ImprovedPerformance	1.000
CollComposite	<---	Collaboration	1.000

Intercepts: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
CollComComposite	3.427	.086	39.945	***	
IncentComposite	2.522	.090	27.981	***	
DecisComposite	2.744	.086	31.799	***	
InfoComposite	3.604	.085	42.206	***	
TrustComposite	3.601	.094	38.235	***	
PerfComposite	3.767	.077	49.196	***	
CollComposite	3.533	.087	40.825	***	

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
InformationSharing	<-->	DecisionSynchronization	.355	.078	4.545	***	
InformationSharing	<-->	incentiveAlignment	.331	.080	4.157	***	
InformationSharing	<-->	CollaborativeCommunication	.349	.077	4.507	***	
Trust	<-->	InformationSharing	.379	.085	4.474	***	
DecisionSynchronization	<-->	incentiveAlignment	.490	.089	5.489	***	
CollaborativeCommunication	<-->	incentiveAlignment	.457	.087	5.266	***	
CollaborativeCommunication	<-->	DecisionSynchronization	.461	.085	5.446	***	
Trust	<-->	DecisionSynchronization	.357	.084	4.235	***	
Trust	<-->	incentiveAlignment	.319	.086	3.726	***	
Trust	<-->	CollaborativeCommunication	.405	.086	4.682	***	

Correlations: (Group number 1 - Default model)

			Estimate
InformationSharing	<-->	DecisionSynchronization	.567
InformationSharing	<-->	incentiveAlignment	.505
InformationSharing	<-->	CollaborativeCommunication	.560
Trust	<-->	InformationSharing	.563
DecisionSynchronization	<-->	incentiveAlignment	.741
CollaborativeCommunication	<-->	incentiveAlignment	.696
CollaborativeCommunication	<-->	DecisionSynchronization	.732
Trust	<-->	DecisionSynchronization	.524
Trust	<-->	incentiveAlignment	.448
Trust	<-->	CollaborativeCommunication	.597

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
InformationSharing	.620	.095	6.519	***	
CollaborativeCommunication	.625	.096	6.519	***	
DecisionSynchronization	.633	.097	6.519	***	
incentiveAlignment	.691	.106	6.519	***	
Trust	.734	.115	6.394	***	
d2	.321	.049	6.519	***	
d1	.427	.066	6.480	***	
eCC	.000				
eIA	.000				
eDS	.000				
eIS	.000				
eT	.000				
eIP	.000				
eC	.000				

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Collaboration	.497
ImprovedPerformance	.135
CollComposite	1.000
PerfComposite	1.000
TrustComposite	1.000
InfoComposite	1.000
DecisComposite	1.000
IncentComposite	1.000
CollComComposite	1.000

Minimization History (Default model)

Iteration		Negative eigenvalues	Condition #	Smallest eigenvalue	Diameter	F	NTries	Ratio
0	e	8		-.397	9999.000	272.312	0	9999.000
1	e	0	195.964		.875	92.027	18	1.043
2	e	0	169.599		.399	52.116	3	.000
3	e	0	157.416		.454	24.587	1	1.172
4	e	0	367.553		.464	14.526	1	1.237
5	e	0	667.180		.374	11.967	1	1.182
6	e	0	871.568		.179	11.674	1	1.087
7	e	0	930.942		.030	11.669	1	1.015
8	e	0	940.949		.001	11.669	1	1.000

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	30	11.669	5	.040	2.334
Saturated model	35	.000	0		
Independence model	7	308.696	28	.000	11.025

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.962	.788	.978	.867	.976
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.179	.172	.174
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	6.669	.274	20.694
Saturated model	.000	.000	.000
Independence model	280.696	227.901	340.947

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.137	.078	.003	.243
Saturated model	.000	.000	.000	.000
Independence model	3.632	3.302	2.681	4.011

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.125	.025	.221	.085
Independence model	.343	.309	.378	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	71.669	77.902		
Saturated model	70.000	77.273		
Independence model	322.696	324.150		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.843	.768	1.008	.916
Saturated model	.824	.824	.824	.909
Independence model	3.796	3.175	4.505	3.814

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	81	110
Independence model	12	14

Execution time summary

Minimization:	.109
Miscellaneous:	.805
Bootstrap:	.000
Total:	.914

Composite Model 2

Analysis Summary

Title

Composite model 2

Groups

Group number 1 (Group number 1)

Notes for Group (Group number 1)

The model is recursive.
Sample size = 86

Variable Summary (Group number 1)

Your model contains the following variables (Group number 1)

Observed, endogenous variables
CollComComposite
IncentComposite
DecisComposite
InfoComposite
TrustComposite
PerfComposite
CollComposite
Unobserved, endogenous variables
Collaboration
ImprovedPerformance
Unobserved, exogenous variables
InformationSharing
CollaborativeCommunication
DecisionSynchronization
incentiveAlignment
d1
d2
Trust
eCC
eIA
eDS
eIS
eT
eIP
eC

Variable counts (Group number 1)

Number of variables in your model:	23
Number of observed variables:	7
Number of unobserved variables:	16
Number of exogenous variables:	14
Number of endogenous variables:	9

Parameter Summary (Group number 1)

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	16	0	7	0	0	23
Labeled	0	0	0	0	0	0
Unlabeled	6	10	7	0	7	30
Total	22	10	14	0	7	53

Models

Default model (Default model)

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments:	35
Number of distinct parameters to be estimated:	30
Degrees of freedom (35 - 30):	5

Result (Default model)

Minimum was achieved
Chi-square = 5.455
Degrees of freedom = 5
Probability level = .363

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
Collaboration	<---	InformationSharing	.365	.099	3.686	***	
Collaboration	<---	CollaborativeCommunication	-.014	.123	-.115	.908	
Collaboration	<---	DecisionSynchronization	.180	.126	1.425	.154	
Collaboration	<---	incentiveAlignment	.082	.112	.734	.463	
Collaboration	<---	Trust	.269	.092	2.932	.003	
ImprovedPerformance	<---	Collaboration	.327	.089	3.653	***	
CollComComposite	<---	CollaborativeCommunication	1.000				
IncentComposite	<---	incentiveAlignment	1.000				
DecisComposite	<---	DecisionSynchronization	1.000				
InfoComposite	<---	InformationSharing	1.000				
TrustComposite	<---	Trust	1.000				
PerfComposite	<---	ImprovedPerformance	1.000				
CollComposite	<---	Collaboration	1.000				

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
Collaboration	<---	InformationSharing	.360
Collaboration	<---	CollaborativeCommunication	-.014
Collaboration	<---	DecisionSynchronization	.179
Collaboration	<---	incentiveAlignment	.086
Collaboration	<---	Trust	.283
ImprovedPerformance	<---	Collaboration	.370
CollComComposite	<---	CollaborativeCommunication	1.000
IncentComposite	<---	incentiveAlignment	1.000
DecisComposite	<---	DecisionSynchronization	1.000
InfoComposite	<---	InformationSharing	1.000
TrustComposite	<---	Trust	1.000
PerfComposite	<---	ImprovedPerformance	1.000
CollComposite	<---	Collaboration	1.000

Intercepts: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
CollComComposite	3.427	.086	39.945	***	
IncentComposite	2.522	.090	27.981	***	
DecisComposite	2.744	.086	31.799	***	
InfoComposite	3.604	.085	42.206	***	
TrustComposite	3.598	.092	39.018	***	
PerfComposite	3.768	.077	49.064	***	
CollComposite	3.533	.087	40.825	***	

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
InformationSharing	<-->	DecisionSynchronization	.355	.078	4.545	***	
InformationSharing	<-->	incentiveAlignment	.331	.080	4.157	***	
InformationSharing	<-->	CollaborativeCommunication	.349	.077	4.507	***	
Trust	<-->	InformationSharing	.363	.083	4.400	***	
DecisionSynchronization	<-->	incentiveAlignment	.490	.089	5.489	***	
CollaborativeCommunication	<-->	incentiveAlignment	.457	.087	5.266	***	
CollaborativeCommunication	<-->	DecisionSynchronization	.461	.085	5.446	***	
Trust	<-->	DecisionSynchronization	.337	.082	4.110	***	
Trust	<-->	incentiveAlignment	.296	.083	3.565	***	
Trust	<-->	CollaborativeCommunication	.372	.083	4.467	***	

Correlations: (Group number 1 - Default model)

			Estimate
InformationSharing	<-->	DecisionSynchronization	.567
InformationSharing	<-->	incentiveAlignment	.505
InformationSharing	<-->	CollaborativeCommunication	.560
Trust	<-->	InformationSharing	.550
DecisionSynchronization	<-->	incentiveAlignment	.741
CollaborativeCommunication	<-->	incentiveAlignment	.696
CollaborativeCommunication	<-->	DecisionSynchronization	.732
Trust	<-->	DecisionSynchronization	.505
Trust	<-->	incentiveAlignment	.425
Trust	<-->	CollaborativeCommunication	.561

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
InformationSharing	.620	.095	6.519	***	
CollaborativeCommunication	.625	.096	6.519	***	
DecisionSynchronization	.633	.097	6.519	***	
incentiveAlignment	.691	.106	6.519	***	
Trust	.704	.110	6.397	***	
d2	.290	.045	6.491	***	
d1	.428	.066	6.481	***	
eCC	.000				
eIA	.000				
eDS	.000				
eIS	.000				
eT	.000				
eIP	.000				
eC	.000				

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
Collaboration	.544
ImprovedPerformance	.137
CollComposite	1.000
PerfComposite	1.000
TrustComposite	1.000
InfoComposite	1.000
DecisComposite	1.000
IncentComposite	1.000
CollComComposite	1.000

Minimization History (Default model)

Iteration		Negative eigenvalues	Condition #	Smallest eigenvalue	Diameter	F	NTries	Ratio
0	e	9		-.394	9999.000	268.236	0	9999.000
1	e	0	281.339		.886	85.669	18	1.039
2	e	0	156.481		.509	48.435	3	.000
3	e	0	167.651		.465	18.874	1	1.137
4	e	0	375.222		.461	8.164	1	1.223
5	e	0	688.593		.362	5.722	1	1.176
6	e	0	894.020		.168	5.460	1	1.084
7	e	0	939.387		.027	5.455	1	1.014
8	e	0	940.194		.001	5.455	1	1.000

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	30	5.455	5	.363	1.091
Saturated model	35	.000	0		
Independence model	7	308.696	28	.000	11.025

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.982	.901	.999	.991	.998
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.179	.175	.178
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.455	.000	10.492
Saturated model	.000	.000	.000
Independence model	280.696	227.901	340.947

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.064	.005	.000	.123
Saturated model	.000	.000	.000	.000
Independence model	3.632	3.302	2.681	4.011

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.033	.000	.157	.483
Independence model	.343	.309	.378	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	65.455	71.689		
Saturated model	70.000	77.273		
Independence model	322.696	324.150		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.770	.765	.888	.843
Saturated model	.824	.824	.824	.909
Independence model	3.796	3.175	4.505	3.814

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	173	236
Independence model	12	14

Execution time summary

Minimization:	.007
Miscellaneous:	.599
Bootstrap:	.000
Total:	.606

Web Address To Access Raw Data File

https://db.tt/usXaAXSf