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Supply chain collaboration: A literature review and empirical analysis to investigate uncertainty and collaborative benefits in regards to their practical impact on collaboration and performance

by

Peter Michael Ralston

A dissertation submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Business and Technology (Supply Chain Management)

Program of Study Committee:
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Iowa State University

Ames, Iowa

2014

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DEDICATION

I dedicate this dissertation to my wife Rebecca for her never ending support and understanding.

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Dr. Scott Grawe has had a tremendous impact on my development as a scholar and hopefully, also as a better person. He is a wonderful role model to emulate professionally and personally. I am indebted to him more than he knows.

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CHAPTER 1. GENERAL INTRODUCTION

1.1 Introduction

This dissertation investigates supply chain collaboration. Supply chain collaboration is defined as a long-term relationship where participants generally cooperate, share information, and work together to plan and even modify their business practices to improve joint performance (Whipple et al., 2010). Analyzing supply chain collaboration provides researchers further understanding of the concept as we seek to move the body of knowledge related to supply chain collaboration forward. Investigating supply chain collaboration delivers practical value to firm managers by seeking methods to increase supply chain collaboration success, identifying what factors lead to, or are generated from, successful collaboration, and determining firm performance benefits of supply chain collaboration.

1.2 Dissertation organization

Utilizing the three-paper model, this dissertation's main chapters follow journal article formatting to separate distinct, but related, analyses and investigations of supply chain collaboration. Chapter 2 will synthesize existing supply chain collaboration literature and provide an assessment of the gaps in the understanding of the concept. The review will be augmented with thoughts from practitioners discussing why or what causes collaboration to occur, what practitioners look for when collaborating with other firms, and what performance implications result when successful collaboration occurs. Chapter 3 will utilize survey data to investigate uncertainty and its impact on supply chain collaboration, and eventually, firm performance. The relationship between uncertainty and supply chain collaboration is a topic yet to be fully explored and this manuscript will add to the literature by looking at uncertainty in

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three forms: behavioral, environmental, and technological. These different forms of uncertainty and their relationship with supply chain collaboration will be investigated individually. Additionally, supply chain collaboration's link with firm financial and operational performance will be analyzed. Finally, the relationship between different forms of uncertainty and supply chain collaboration will be moderated by varying factors in order to determine interaction effects. This analysis step seeks to provide managers input on external forces and internally generated mechanisms which may impact uncertainty's relationship with supply chain collaboration. Chapter 5 discusses a unique mediating factor between supply chain collaboration and firm performance termed collaborative benefits. Identification of these benefits is important as we seek to determine outcomes from collaboration over and above direct performance effects. A series of moderators are also investigated with their impact on the relationship between supply chain collaboration and collaborative benefits analyzed. Establishing boundary conditions around significant, direct effects provide researchers and practitioners more information when studying and executing business functions.

1.3 References

Whipple, J. M., Lynch, D. F., and Nyaga, G. N. 2010. "A Buyer's Perspective on Collaborative Versus Transactional Relationships." *Industrial Marketing Management* 39(3):507-518.

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CHAPTER 2. SUPPLY CHAIN COLLABORATION: A LITERATURE REVIEW AND SUGGESTED RESEARCH AGENDA

A paper to be submitted to the *International Journal of Physical Distribution and Logistics Management*

Peter Ralston

2.1 Abstract

As firms seek to remain competitive in today's marketplace, they often look externally for assistance in meeting customer expectations. One way this can be achieved is through supply chain collaboration. Supply chain collaboration is defined as a long term relationship where participants cooperate, share information, and work together to plan and even modify their business practices to improve joint performance. The current research reviews the past literature on supply chain collaboration. The review is augmented with practitioner interviews. The interviews and past literature are compared to provide further insights on supply chain collaboration. Three main contributions are provided by the current research. First, past literature is reviewed and resultant themes discussed. Second, issues practitioners find relevant when thinking about supply chain collaboration are discussed. Finally, the literature review and interviews are synthesized to understand if existing research can assist the business community in order to sustain successful supply chain collaboration, and what, if any, remaining gaps in the literature may be further investigated for the benefit of both the academic and business practitioner community.

2.2 Introduction

Firms have numerous options when it comes to goods or service production and delivery. Some firms rely on becoming a large, vertically integrated enterprise in which one firm, or a

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series of parent company owned subsidiaries, performs all tasks related with manufacturing and distributing a good or service to market (Forbes and Lederman, 2010; Hitt, 2011; Jensen and Pedersen, 2012). Another method of goods or service production and delivery involves a single firm focusing on their core capabilities and partnering with other organizations for business functions which are necessary to, but outside the main focus of, the original firm (Barney, 1991; Esper et al., 2010). In this case, firms actively seek partners to collaborate by utilizing joint effort and skills to provide value neither firm could wholly generate individually (Corsten and Kumar, 2005).

Supply chain collaboration is defined as a long term relationship where participants generally cooperate, share information, and work together to plan and even modify their business practices to improve joint performance (Whipple et al., 2010). Supply chain collaboration looks to capitalize on the expertise and skill of individual firms to collectively provide benefits to end consumers. Fawcett et al. (2008) state that collaboration's goal is to have parties work cooperatively to devise and implement better approaches to solving problems and delivering the value customers expect. Further the authors assert collaboration goes beyond managing transactions for efficiency to managing relationships for creativity and continuous improvement. These collaborative relationships are long-term endeavors where partners know the capabilities and needs of each other and actively seek to develop new or improved practices.

Jones and Abernathy (2012) discuss the collaboration between a tile manufacturer (Dal-Tile), a home goods manufacturer (Whirlpool), and a 3PL (Transplace), that successfully found a solution to an issue many thought impossible to solve. Dal-Tile needed to ship flooring and other tile goods from Mexico to the United States, but could not effectively utilize all of the trailer's capacity due to weight restrictions. Dal-Tile and Transplace explored the potential

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benefits of shipping cubic capacity trailers (full containers from a weight and space perspective) to the United States, but also understood that the product assortment of Dal-Tile would most likely prevent this from happening. Dal-Tile's products were simply too dense to cube out a trailer. Transplace identified Whirlpool as a potential collaborative shipping partner with Dal-Tile because of the desired shipping route (Whirlpool also shipped goods to the United States from a nearby Mexican location to Dal-Tile's facility) and because of the relatively low weight freight of Whirlpool's merchandise. A shipment of Whirlpool dryers could fill container physical space capacity, but take only 20% of the weight capacity of the trailer. Transplace brought the two companies together to reduce costs and environmental impact. The manufacturers share co-loaded tractor trailers from Mexico to the United States. Dal-tile and Whirlpool have seen a 20-30% reduction each in process and resource costs.

While the above instance illustrates the positives of supply chain collaboration from cost reduction to operational process enhancements, not all such partnerships are beneficial. Sabath and Fontanella (2002) discuss the unfulfilled promise of supply chain collaboration citing an overreliance on technology, treating every customer/partner the same, and a lack of trust as barriers to successful collaborative results. Rick Jackson, Executive V.P. at Mast Logistics (a subsidiary of The Limited Brands) and immediate past chair of the CSCMP Board of Directors, discussed collaboration in his opening remarks at the 2013 CSCMP Global Conference. He noted that companies today espouse the values of collaboration, but are often not organized for it. Compensation and incentive structures do not encourage collaboration. Further performance objectives and key metrics are too often functionally based (Ellinger, 2000; Esper et al., 2010). If companies want to derive the benefits of collaboration, they have to be prepared for the work that goes into collaborating. Maintaining long-term strategic coordination between partners,

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poor internal communication prior to collaboration, and the speed with which to expect benefits have all lead to collaborative failures (Bowersox et al., 1999; Fawcett and Magnan, 2002; Barratt, 2004; Daugherty et al., 2006).

Other challenges to supply chain collaboration range from the need for coordination of operational resources to developing the necessary capabilities required for implementing successful collaboration (Thron et al., 2006). Additionally, desired collaborative benefits may actually prevent supply chain collaboration from occurring. For instance some firms view one party's collaborative win (i.e. a reduction of inventory or lowering of costs) as a redistribution of these expenses to other members in the supply chain (Ireland and Bruce, 2000; Barratt, 2004).

Firms need to understand how to achieve the benefits of supply chain collaboration, while mitigating the inhibitors to, and downsides of, collaborative relationships. While scholarly research has been done in the area, recent articles have called for more research, highlighting the importance of supply chain collaboration to the business community (Daugherty, 2011; Stank et al., 2011; Ellinger and Richey Jr, 2013). A key starting point is the review of past literature to understand various approaches to supply chain collaboration, common threats to successful partnerships, and the true benefits of supply chain collaboration. Therefore, the current research seeks to synthesize past work while also providing current insight on collaboration from managers in business practice through qualitative interviews.

The paper begins with a description of the methodology utilized to perform the literature review followed by the review itself. Then a section summarizing interviews with supply chain practitioners on supply chain collaboration is presented. Finally, a discussion section will

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integrate the literature review and the interviews to provide research and managerial implications as well as present a suggested future research agenda.

2.3 Methodology

As one of the main goals at the outset of this research project was to better understand supply chain collaboration, a literature review was undertaken to synthesize past findings and determine an agenda for future exploration. Effectively using past evidence, in this case prior literature on supply chain collaboration, is one way to interpret a phenomenon and identify what steps to take next in order to further its study (Rousseau et al., 2008). Previous literature was systematically reviewed in six top supply chain journals: *Decision Sciences, The International Journal of Logistics Management, International Journal of Physical Distribution and Logistics Management, Journal of Business Logistics, Journal of Operations Management,* and *Journal of Supply Chain Management*.

The review covered the previous 25 years for each journal by using a keyword search of "collaboration" in the ABI/Inform, Ebsco Business Source Elite, and Google Scholar databases. Using a keyword search is one method to bring objectivity to the article gathering process for literature reviews (Grawe, 2009; Fawcett et al., 2012). A total of 133 articles were identified using this procedure. The number of articles returned across journals for each of the academic databases is shown in Table 1. Three themes emerged: antecedents to collaboration, the relationship between supply chain collaboration and performance, and collaborative difficulty. These three themes will be discussed in further depth to elaborate on previous work as well as to create a blueprint for future research.

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2.4 Literature Review

2.4.1 Antecedents to Collaboration

Successful supply chain management requires a long-term orientation with the sharing of risks and rewards balanced over time between partners (Cooper and Ellram, 1993). Collaboration between supply chain partners has been referred to as the driving force behind effective supply chain management (Cooper and Ellram, 1993; Min et al., 2005). A collaborative focus can provide several dividends throughout the supply chain. Min et al. (2005) noted that supply chain collaboration can positively impact operational effectiveness and efficiency as well as profitability. A number of studies in the supply chain literature have focused on collaboration and what it takes to create a successful union.

In an attempt to define the "how" and "why" of supply chain collaboration Frankel et al. (2002) analyzed the practice of efficient customer response (ECR) in the grocery industry. The authors noted that while ECR may not have had the impact on grocery retailers as many would have hoped, one benefit seemed to be the relationships developed between suppliers and retailers. Fifteen pairs of firms were qualitatively studied regarding ECR and collaboration. Five factors were identified as being key to successful collaboration: a willingness to innovate and change, understanding the other partner's business, common goals and objectives, appropriate measures and incentives, and information sharing (Frankel et al., 2002). Simatupang and Sridharan (2005) used a conceptual piece to similarly advocate that collaborations must have information sharing, decision synchronization, and incentive alignment amongst firms in supply chain partnerships. Min et al. (2005) employed results from a survey and qualitative interviews to learn more about supply chain collaboration. From their research, the authors determined six

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antecedents to supply chain collaboration: strategic intent, internal alignments, relationship orientation, relationship-specific investment, free flow of information and heightened communication, as well as formalization. Fawcett et al. (2008) utilized a literature review and series of qualitative interviews to identify seven broad categories of antecedents to supply chain collaboration which included management commitment, supply chain mapping and role definition, information sharing and system integration, people management and development, supply chain performance measurement, relationship management and trust building, and rationalization and simplification. Additionally, the authors were among the first researchers to use specific theoretical paradigms in explaining supply chain collaboration. Fawcett et al. (2008) advocated for a contingency theory approach by firms when identifying needed changes to supply chains based on customer expectations or market conditions. Firm collaboration could be based on dynamic conditions evolving over time instead of intense firm versus firm competition. Fawcett et al. (2008) then proposed firms employ a force field analysis approach when entering supply chain collaborations. Recognizing that firm processes are often set or established, a force field approach advocates partners creatively develop collaborative solutions to shared supply chain issues and then unfreeze individual firm processes, align these processes to interact effectively across the supply chain for the predetermined collaborative solution, and then refreeze new firm processes to address the supply chain challenge. This dynamic should occur throughout the duration of a supply chain collaboration to consistently and effectively meet customer demands while remaining jointly profitable.

Chen et al. (2010) applied the resource based view of the firm to describe how buyers perceive the collaboration that results from relationships developed with third party logistics providers (3PL). Using survey responses from China, the authors found support for top

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management championship, 3PL Customer Service Expertise, and Guanxi - the informal personal relationships in Chinese business settings - acting as antecedents to supply chain collaboration. Hartmann and DeGrahl (2011) also employed the resource based view of the firm to describe and then survey data from Germany to support supply chain partner insight and communication both being positively related to supply chain collaboration. Communication has been discussed before, but partner insight, or an intimate knowledge of your partner through information received from themselves or others, was a novel contribution to the literature.

Zacharia et al. (2011) examined supply chain collaboration from a different point of view and focused on episodic collaboration between firms. Episodic collaboration deals with collaborative initiatives that have a defined beginning and end with a specific purpose (Zacharia et al., 2011). The authors found absorptive capacity and collaborative process competence both had a positive relationship with collaborative engagement. Collaborative engagement describes a firm's involvement in a collaboration with more involvement associated with higher performance. Fawcett et al. (2012) used a dynamic capabilities perspective, with roots from the resource based view of the firm, to talk about how supply chain collaborations form. Using a structured interview approach, the authors found firms typically collaborate as a response to changes in the competitive environment. Utilizing this perspective highlights the value of collaboration as a reaction to market conditions and not necessarily a direct response to business competition. From a survey of retail executives in over 26 different industries, Richey et al. (2012) determined that technological complementarity between partners and flexibility help firms collaborate.

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Table 2 provides a listing of the articles used in the collaborative antecedent review. Understanding what it takes to collaborate, across a variety of environments and situations, can lead firms to successful relationships with partners which hopefully impact performance.

2.4.2 Collaboration and Performance

While supply chain collaboration has been discussed since the late 1980's and early 1990's in supply chain literature (Bowersox and Daugherty, 1987; Ellram and Cooper, 1990; Cooper and Ellram, 1993), the volume of empirical work assessing collaboration's link with performance has steadily increased since the early 2000s. In a survey of senior logistics and supply chain executives from the Council of Logistics Management (currently CSCMP), Stank et al. (2001b) determined that internal collaboration between departments within a firm directly impacted logistics service performance. The authors also found that external collaboration did not share significant, direct relationship with logistics service performance. However, external collaboration with supply chain entities influenced increased internal collaboration. The authors concluded a firm should focus on internal and external collaboration because of the direct and indirect benefits each could have on logistics service performance. Sinkovics and Roath (2004) surveyed logistics managers of companies in Great Britain that also outsourced certain supply chain processes or services to third party logistics providers. Contrary to Stank et al. (2001b), the authors did not find a direct relationship between any form of collaboration and logistics performance. However, Sinkovics and Roath (2004) found a positive, significant relationship among external supply chain collaboration and market performance. Corsten and Felde (2005) utilized research from Switzerland buyer/supplier relationships to show a connection between supplier collaboration and both buyer innovative capability and firm financial performance. Perhaps more importantly, the authors looked to establish trust and dependence as moderators to

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the collaboration/performance links. The authors concluded that collaboration in the presence of high trust had buyers experience different (i.e. better) innovative capabilities than those relationships which existed in the presence of low trust. Buyers which experienced low dependence with their supply chain partner experienced better innovative capabilities than highly dependent counterparts. Trust and dependence did not statistically significantly moderate the collaboration to firm financial performance link.

Min et al. (2005) used a survey and qualitative interviews to develop a conceptual model of supply chain collaboration including antecedents and outcomes. The respondents and interview participants were CSCMP members. The authors concluded that positive benefits of collaboration were not likely to be immediately visible. Some medium to long term benefits were increases to efficiency, effectiveness and profitability. However, one of the major advantages of successful collaborations was the reinforcement and expansion of the collaborative relationship between the parties involved (Min et al., 2005). This suggests that relationships evolve over time and that supply chain collaborations with a small or limited scope at the origin can grow into more involved, deeper collaborative arrangements. Sanders (2007) surveyed high-ranking executives in U.S. manufacturing firms to investigate the role e-business technologies had on intra and inter-organizational supply chain collaboration. The author found a positive, direct relationship between intra-organizational collaboration and organizational performance. Additionally, inter-organizational collaboration indirectly affected operational performance through intra-organizational collaboration. Rosenzweig (2009) used a different sample of senior executives in U.S. firms to establish a positive relationship between electronic collaboration, the connection between suppliers and downstream customers, and business and operational performance. The author also established certain boundary conditions by testing the moderating

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effects of product complexity, environmental munificence, and market viability on the collaboration/performance relationships. Of the three moderating variables, only environmental munificence (business environments where demand may outstrip supply or potential customers abound) significantly constrained the e-collaboration - operational performance relationship.

Mishra and Shah (2009) took a unique approach when examining collaboration's impact on market and project performance in the area of new product development. The authors utilized the constructs of supplier involvement, customer involvement and cross-functional involvement to represent inter and intra organizational collaboration. Further the authors created one second order factor from the three previously mentioned constructs called collaborative competence. The second-order collaborative competence construct's relationship with both market and project performance was then examined with survey data from six countries including the United States. The results indicated a direct relationship between collaborative competence and project performance, but an indirect relationship between collaborative competence and market performance mediated through project performance. The findings show the value of intra and interorganizational collaboration on new product development project performance. While interorganizational collaboration did not hold a direct, significant relationship with the various types of performance in Mishra and Shah (2009), Sanders (2007), and Stank et al. (2001b); each article espouses the value of external collaboration and the indirect benefits it can have for firms.

Zacharia et al. (2009) looked to identify boundary conditions around collaboration and performance by introducing moderating variables with collaboration and mediating variables between collaboration and performance. The authors hypothesized that the moderating variables of supply chain partner insight and interdependence between knowledge and process of participants would positively enhance the level of collaboration among the supply chain partners.

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Empirical analysis of survey responses from supply chain professionals supported these hypotheses. Additionally the authors hypothesized that collaboration would lead to favorable operational and relational outcomes which would then impact business performance. Results supported collaboration's relationship with operational and relational outcomes and operational outcomes impact on business performance. The findings reveal that while collaboration has been shown to have a direct relationship with performance, some mediators can be present in the collaboration / performance link. Nyaga et al. (2010) further examined the idea of relational mediators between supply chain collaboration and performance in an attempt to understand if successful collaborative relationships pay for the additional expense incurred to make them work. Using respondents generated from various mailing lists, the authors separated out buyers and suppliers to investigate how collaborative activities influence trust and commitment and then these mediating variables' relationship with satisfaction and performance. While certain results were different between the buyer and supplier samples, the general consensus from the two compared samples was that developing trust and commitment was desirable. Actions that buyer or suppliers could take to improve trust and commitment can result in greater benefits from the collaborative relationship (Nyaga et al., 2010). The authors point out that the relational aspects of successful collaborations can have a long term financial impact on firms.

Allred et al. (2011) utilized survey responses and qualitative interviews to conclude that collaboration can act almost as a bridge between supplier and customer orientation to impact productivity and relationship satisfaction. The researchers also present a temporal aspect which shows the benefits of collaboration over time to improve profitability and growth. The work by Allred et al. (2011) and Fawcett et al. (2011) looked to establish supply chain collaboration as a dynamic capability. In other words collaboration can be utilized to ensure the adaptability of

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organizations and supply chains in the face of environmental uncertainty (Eisenhardt and Martin, 2000; Fawcett et al., 2011). Cao and Zhang (2011) conceptualized supply chain collaboration similarly, yet distinctly, from a resource based view perspective. The authors employed empirical survey data to validate a structural model in which collaboration was a resource which led to the collaborative advantage capability which positively impacted collaborative performance. Collaborative advantage was viewed as this synergistic force which brought supply chain partners together and helped in creating superior performance. While the antecedents in Zacharia et al. (2011) have been discussed previously, the research establishes that operational and relational outcomes of collaboration are influenced by the moderating effect of absorptive capacity and collaborative process competence on collaboration. The authors' findings indicate learning from past collaborations can influence the success of future collaborations.

Table 3 briefly summarizes the papers reviewed in this section. While some studies support a direct relationship between supply chain collaboration and performance, others find no significance. Setting and type of performance analyzed makes an impact; however, if some collaborations cannot report a direct effect with performance why would firms enter into these arrangements. This is best answered by the indirect effects collaboration can have on performance through synergies shared and expanded on by partners as well as the relational benefits of successful collaborations. While quantifying the true cost of collaborations and judging the value they provide to firms remains a challenge, one cannot argue the supply chain collaborations can impact performance.

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2.4.3 Collaborative Failure

One prevalent theme throughout the literature on supply chain collaboration was the difficulty in achieving successful collaboration, real or perceived. While understanding the reasons successful collaborations are labeled disappointments by one or more member firms is valuable, certain tangible reasons which prevent collaborative success have been identified. Mejias-Sacaluga and Prado-Prado (2002) used interviews of representatives of Spanish Grocery chains to determine the impacts of efficient customer response on collaboration between firms. The qualitative analysis led the authors to suggest that successful collaborations develop from a form of management and design that considers issues holistically instead of solely focusing on firm financial outcomes (i.e. employee empowerment, innovation, and organizational learning). If management has not evolved to such a format, collaborations which do not impact performance directly may be considered failures. Fawcett and Magnan (2002) utilize survey research and interviews to determine that supply chain collaborations between firms are sometimes easier to establish than inter-functional firm integration. However, this lack of internal support can lead to poor external collaboration because what is agreed to between partners cannot be executed by the firm because of a lack of internal alignment. Moberg and Speh (2003) use qualitative interviews and a survey to determine the impact of questionable supply chain business practices on supply chain collaboration. The authors discuss questionable supply chain practices such as a firm always claiming the percent defective allowance on every delivery, even if no damage existed; returning out-of-date merchandise or charging penalties on late deliveries even if the late delivery was caused by themselves (no dock space / overscheduling, asking for a later delivery, etc…). Moberg and Speh (2003) determine more successful collaborations have a lower reported number of questionable business practices by a

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partner versus less successful collaborations. Not surprisingly there is a higher level of trust in these relationships versus collaborations where one party has a high number of questionable supply chain practices.

Kampstra et al. (2006) use a literature review and professional experience to identify a number of reasons why collaborations may fail including time, IT infrastructure, trust, organizational design, competition, fear of external partner pressure, functional powerhouses, and financial reasons. While the authors discuss this to an extent, two missing elements which appear to contribute to collaborative failure are dependence on the relationship and lack of alignment/alliance scope. These thoughts are echoed in a piece written by Fawcett et al. (2012) in which the authors utilized structured interviews from participants in case studies to determine how collaborative capabilities develop including aspects that enhance as well as inhibit collaboration. Collaborative enhancers included commitment and cultural and structural enablers such as a trust dominant culture, accurate and timely information sharing, supplier development and integration programs, process transparency, and disciplined decision making and follow through. Not surprisingly, the authors found that collaborative inhibitors were typically the opposite of the enhancers. Organizational structure that promoted functional silos, poor strategic alignment, resistance to change, insufficient trust, inadequate information sharing and alliance management practices as well as poorly defined roles and responsibilities contributed to inhibiting collaborative success. Fawcett et al. (2012) suggest looking at collaboration as a dynamic capability and one that can respond to changes in the competitive environment. The authors recognize that choosing not to collaborate is not the major downfall of firms; rather it is their inability to collaborate if desired.

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Table 4 briefly points out the articles and collaborative performance detractors discussed above. Achieving collaborative success can be challenging. Failure is a risk of doing business, but the previous research highlights common pitfalls to supply chain collaborations that in most cases can be prevented. While collaborations and their performance will always be exposed to market forces beyond the control of the participants, managing internal success factors of collaboration is a necessary component to increase the chances of desired supply chain collaboration improvements and performance.

2.5 Structured Interviews

As the previous literature review depicted, there are a number of reasons collaborations are formed, performance varies across collaborations, and collaborative failure is as common as collaborative success. To further investigate supply chain collaboration a number of interviews were conducted with supply chain professionals representing a variety of industries. Interviews provide a robust opportunity to learn more about supply chain collaboration from those in business practice along with providing the opportunity to explore what makes collaboration necessary and more successful (Fawcett et al., 2012). A semi-structured interview format was followed with open ended questions being asked and follow up determined based on the provided answer (Kärkkäinen et al., 2007). Interviews lasted between an hour and ten minutes to an hour and a half.

Firms collaborated for a number of reasons; specific reasons differed by industry. A representative of a domestic retailer talked about looking for collaborators based on subject matter expertise or an outside perspective on an internally developed solution. A specialist from the oil industry talked about sharing risk with partners and that collaborators were usually like

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firms that undertook projects together because of the finances involved. Additionally, certain partners were sought because of their geographic specific regional knowledge. Another interviewee, employed by a large third-party logistics (3PL) firm, noted that his firm views collaboration differently. Collaborations were usually started by partner firms which desired solutions to specific problems. These opportunities provided the 3PL with information about the partner (and vice versa) while also potentially expanding the collaborative relationship to other partner firm operations offering larger and better solutions as a whole to the partner.

Collaborators look for different things when partnering, but one common theme was that of financial solvency. Firms did not want to collaborate with other firms which may not be able to function in the long-term because most stated it was a waste of time and resources. Credibility was another factor named important by the respondents. Credibility could stem from word of mouth recommendations, industry certifications, or being ranked highly in their industry by trade publications. Credibility, good or bad, could also stem from past collaborations. Past, successful interactions could lead to additional opportunities for collaboration while previous negative experiences also lessened the possibility of working with certain partners in the future. Finally, years in business was important to some respondents' firms due to the perceived stability of those partners with longevity and expertise.

Further investigation led to the discovery of some other insights. Uncertainty, defined broadly as the degree to which change occurs (Wilding, 1998; Van der Vorst and Beulens, 2002), was seen as a primary driver of collaboration. This finding is something supply chain literature has done little to support. Additionally, uncertainty and risk were distinct concepts when speaking with business practitioners. One respondent stated, "My firm is forced to think outside of the box due to uncertainty." Another mentioned that, "Any uncertainty lends itself to

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collaboration with another firm." Certain reasons why were risk sharing or needed external creativity to handle larger issues. Finally, in an attempt to determine what firms seek from collaboration, respondents were asked what should result from collaboration: improved performance or tools which should improve performance. A retail representative whose organization is one step removed from the end customer felt that collaboration needed to provide a solution or action item which would then impact firm performance. The retail representative also detailed the need for collaborations to have open lines of communication along with an understanding of the benefits of the relationship for each supply chain member. The oil industry representative, whose company had retail outlets, but whose responsibilities lay with other areas of the business had a slightly different outlook. They felt collaboration had to directly lead to performance. Assessing collaboration with performance was one of the easiest and best ways to grade the performance of the supply chain partner with which they were working. Reconciling the difference between the outlook of the retailer and oil company proved difficult. However the response of the 3PL interviewee provided some ideas. The 3PL employee stated that when their firm partners with another company for the first time, the 3PL looks to immediately address performance. This is due to the partner firm usually seeking out the 3PL for a specific reason; additionally seeing performance improvements sometimes leads to additional opportunities. This somewhat tangible connection between problem and performance consistently led the 3PL to expand the relationship with the partner and provide solutions or items that eventually positively impacted performance. This perspective signals the impetus for collaboration, as well as potential "distance" from the consuming customer, may impact whether collaboration must directly lead to performance or indirectly effect performance through some other capability or action item.

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2.6 Discussion, Implications, and Conclusion

While much work has been accomplished when investigating supply chain collaboration, there is still more to examine and understand with the topic (Daugherty, 2011). The preceding literature review and structured interviews expose aspects of supply chain collaboration that need to be better understood. Establishing boundary conditions of supply chain collaborations must be further explored to determine when to collaborate and what factors lead to collaboration success. Understanding the how and when of supply chain collaboration is a valuable area of research to assist the academic community in gaining a better understanding of the workings of collaboration. Business practitioners would be rewarded with the knowledge of what resources are required to make collaborations successful and whether or not the current business situation requires collaboration. This information aids firms in the traditional "make versus buy" decision.

Complementary to establishing boundary conditions around successful supply chain collaborations is understanding what additional antecedents to collaboration exist as well as determining if there are mediating variables between supply chain collaboration and performance. Answering these questions can provide valuable insight to researchers and practitioners alike. For instance a majority of the antecedents to supply chain collaboration in the literature were relational or technological in nature. Are there other potential antecedents to collaboration such as environmental uncertainty or new product development and innovation? The interview respondents discussed uncertainty repeatedly when speaking about supply chain collaboration. Do collaborations derived from ambiguity or unpredictability in the marketplace operate differently than others? Collaborations borne from technology sometimes see interactions between firms take place through electronics limiting human involvement.

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Relational initiators to collaborations can see partnerships based on personal communications and cooperation. Uncertainty may change the way collaborations run from communication and interaction to the shared understanding of the reason for the business relationship.

With the disagreement among practitioners around whether supply chain collaboration could lead directly to performance or if the collaboration/performance relationship was indirect through some other mediators; more research is needed to fully understand these differences. Clearly articulating why supply chain collaborations occur, what benefits exist from the collaboration for all parties involved, and what to expect from a successful collaboration seems important. However, can more be done? Perhaps realizing how far the collaboration is removed from the end customer changes the purpose, intent, and desired outcomes of supply chain collaboration. As a case in point, a retail employee stated that collaborations are entered for solutions to problems or action items that would be brought to the end consumer indicating the collaborative outcome did not have a direct relationship with performance. Is this because the retailer already feels comfortable with knowing what must be accomplished for firm performance themselves? Rather, when they collaborate it is to head off potential or experienced customer issues and by correcting these issues positive performance is ensured. The oil industry representative charged with exploration and delivering oil to refineries had a different outlook on collaboration. Due to the nature of the industry, necessity of needing partners due to capital outlays required for projects completions, or the geographic or regulatory knowledge shared only by "local" partners to get projects completed; there was little else to grade the collaborative project on other than performance (i.e. did this project meet our expectations, was the project completed). The exploration of, discovery, and delivery of oil to refineries impacts the end consumer, but is still further removed than what the retailer experiences. Perhaps understanding

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this changes the collaborative performance relationship as well as how collaborations are graded in terms of success or not.

This piece represents a start to the further discovery of issues in and around supply chain collaboration. The literature review serves as a synthesis of previous work while the interviews provide examples of current challenges faced by practitioners. Unifying the information from both provides researchers with potential areas of further analysis to better address and increase our understanding of supply chain collaborations and their potential positive benefits.

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2.7 References

Allred, C. R., Fawcett, S. E., Wallin, C., and Magnan, G. M. 2011. "A Dynamic Collaboration Capability as a Source of Competitive Advantage." *Decision Sciences* 42(1):129-161.

Barney, J. B. 1991. "Firm Resources and Sustained Competitive Advantage." *Journal of Management* 17(1):99-120.

Barratt, M. 2004. "Understanding the Meaning of Collaboration in the Supply Chain." *Supply Chain Management: An International Journal* 9(1):30-42.

Bowersox, D. J., and Daugherty, P. J. 1987. "Emerging patterns of logistical organizations." *Journal of Business Logistics* 8(1):46-60.

Bowersox, D. J., Closs, D. J., and Stank, T. P. 1999. *21st Century Logistics: Making Supply Chain Integration a Reality*. Oak Brook, IL: Council of Logistics Management.

Cao, M., and Zhang, Q. 2011. "Supply Chain Collaboration: Impact on Collaborative Advantage and Firm Performance." *Journal of Operations Management* 29(3):163-180.

Chen, H., Tian, Y., Ellinger, A. E., and Daugherty, P. J. 2010. "Managing Logistics Outsourcing Relationships: An Empirical Investigation In China." *Journal of Business Logistics* 31(2):279-299.

Cooper, M. C., and Ellram, L. M. 1993. "Characteristics of Supply Chain Management and the Implications for Purchasing and Logistics Strategy." *International Journal of Logistics Management* 4(2):13-24.

Corsten, D., and Kumar, N. 2005. "Do Suppliers Benefit from Collaborative Relationships with Large Retailers? An Empirical Investigation of Efficient Consumer Response Adoption." *Journal of Marketing* 69(3):80-94.

Daugherty, P. J., Richey, R. G., Roath, A. S., Min, S., Chen, H., Arndt, A. D., and Genchev, S. E. 2006. "Is Collaboration Paying Off for Firms?" *Business horizons* 49(1):61-70.

Daugherty, P. J. 2011. "Review of Logistics and Supply chain Relationship Literature and Suggested Research Agenda." *International Journal of Physical Distribution & Logistics Management* 41(1):16-31.

Eisenhardt, K. M., and Martin, J. A. 2000. "Dynamic Capabilities: What are They?" *Strategic Management Journal* 21(10-11):1105-1121.

Ellinger, A., and Richey Jr, R. G. 2013. "Some Ideas and Guidance for Prospective IJPDLM Authors." *International Journal of Physical Distribution & Logistics Management* 43(3).

www.manaraa.com

Ellinger, A. E. 2000. "Improving Marketing/Logistics Cross-Functional Collaboration in the Supply Chain." *Industrial Marketing Management* 29(1):85-96.

Ellram, L. M., and Cooper, M. C. 1990. "Supply Chain Management, Partnership, and the Shipper-Third Party Relationship." *International Journal of Logistics Management* 1(2):1-10.

Esper, T., Ellinger, A., Stank, T., Flint, D., and Moon, M. 2010. "Demand and Supply Integration: A Conceptual Framework of Value Creation Through Knowledge Management." *Journal of the Academy of Marketing Science* 38(1):5-18.

Fawcett, S. E., and Magnan, G. M. 2002. "The Rhetoric and Reality of Supply Chain Integration." *International Journal of Physical Distribution & Logistics Management* 32(5):339-361.

Fawcett, S. E., Magnan, G. M., and McCarter, M. W. 2008. "A Three-Stage Implementation Model for Supply Chain Collaboration." *Journal of Business Logistics* 29(1):93-112.

Fawcett, S. E., Wallin, C., Allred, C., Fawcett, A. M., and Magnan, G. M. 2011. "Information Technology as an Enabler of Supply Chain Collaboration: A Dynamic Capabilities Perspective." *Journal of Supply Chain Management* 47(1):38-59.

Fawcett, S. E., Fawcett, A. M., Watson, B. J., and Magnan, G. M. 2012. "Peeking Inside the Black Box: Toward an Understanding of Supply Chain Collaboration Dynamics." *Journal of Supply Chain Management* 48(1):44-72.

Forbes, S. J., and Lederman, M. 2010. "Does Vertical Integration affect Firm Performance? Evidence from the Airline Industry." *The RAND Journal of Economics* 41(4):765-790.

Frankel, R., Goldsby, T. J., and Whipple, J. M. 2002. "Grocery Industry Collaboration in the Wake of ECR." *International Journal of Logistics Management, The* 13(1):57-72.

Grawe, S. J. 2009. "Logistics Innovation: A Literature-Based Conceptual Framework." *International Journal of Logistics Management* 20(3):360-377.

Hartmann, E., and De Grahl, A. 2011. "The Flexibility of Logistics Service Providers and Its Impact on Customer Loyalty: An Empirical Study." *Journal of Supply Chain Management* 47(3):63-85.

Hitt, M. A. 2011. "Relevance of Strategic Management Theory and Research for Supply Chain Management." *Journal of Supply Chain Management* 47(1):9-13.

Ireland, R., and Bruce, R. 2000. "CPFR: Only the Beginning of Collaboration." *Supply Chain Management Review* 4(4):80-88.

www.manaraa.com

Jensen, P. D. Ø., and Pedersen, T. 2012. "Offshoring and International Competitiveness: Antecedents of Offshoring Advanced Tasks." *Journal of the Academy of Marketing Science* 40(2):313-328.

Jones, S., and Abernathy, G. 2012. The Power of Collaboration: Optimizing Freight Costs by Sharing Capacity (Weight and Space). https://cscmp.org//membersonly/case-studies/power-collaboration-optimizing-freight-costs-sharing-capacity-weight-and.

Kampstra, R., Ashayeri, J., and Gattorna, J. 2006. "Realities of Supply Chain Collaboration." *International Journal of Logistics Management, The* 17(3):312-330.

Kärkkäinen, M., Laukkanen, S., Sarpola, S., and Kemppainen, K. 2007. "Roles of Interfirm Information Systems in Supply Chain Management." *International Journal of Physical Distribution & Logistics Management* 37(4):264-286.

Mejias-Sacaluga, A., and Prado-Prado, J. C. 2002. "Integrated Logistics Management in the Grocery Supply Chain." *International Journal of Logistics Management, The* 13(2):67-78.

Min, S., Roath, A. S., Daugherty, P. J., Genchev, S. E., Chen, H., Arndt, A., and Richey Jr, R. G. 2005. "Supply Chain Collaboration: What's Happening?" *International Journal of Logistics Management* 16(2):237-256.

Mishra, A. A., and Shah, R. 2009. "In Union Lies Strength: Collaborative Competence in New Product Development and its Performance Effects." *Journal of Operations Management* 27(4):324-338.

Moberg, C. R., and Speh, T. W. 2003. "Evaluating the Relationship Between Questionable Business Practives and the Stregnth of Supply Chain Relationships." *Journal of Business Logistics* 24(2):1-19.

Nyaga, G. N., Whipple, J. M., and Lynch, D. F. 2010. "Examining Supply Chain Relationships: Do Buyer and Supplier Perspectives on Collaborative Relationships Differ?" *Journal of Operations Management* 28(2):101-114.

Richey, R. G., Adams, F. G., and Dalela, V. 2012. "Technology and Flexibility: Enablers of Collaboration and Time-Based Logistics Quality." *Journal of Business Logistics* 33(1):34-49.

Rosenzweig, E. D. 2009. "A Contingent View of e-Collaboration and Performance in Manufacturing." *Journal of Operations Management* 27(6):462-478.

Rousseau, D. M., Manning, J., and Denyer, D. 2008. "Evidence in Management and Organizational Science: Assembling the Field's Full Weight of Scientific Knowledge Through Syntheses." *The Academy of Management Annals* 2(1):475-515.

www.manaraa.com

Sabath, R. E., and Fontanella, J. 2002. "The Unfulfilled Promise of Supply Chain Collaboration." *Supply Chain Management Review* 6(4):24-29.

Sanders, N. R. 2007. "An Empirical Study of the Impact of e-Business Technologies on Organizational Collaboration and Performance." *Journal of Operations Management* 25(6):1332-1347.

Simatupang, T. M., and Sridharan, R. 2005. "The Collaboration Index: A Measure for Supply Chain Collaboration." *International Journal of Physical Distribution and Logistics Management* 35(1):44-62.

Sinkovics, R. R., and Roath, A. S. 2004. "Strategic Orientation, Capabilities, and Performance in Manufacturer - 3PL Relationships." *Journal of Business Logistics* 25(2):43-64.

Stank, T. P., Keller, S. B., and Daugherty, P. J. 2001. "Supply Chain Collaboration and Logistical Service Performance." *Journal of Business Logistics* 22(1):29-48.

Stank, T. P., Dittmann, J. P., and Autry, C. W. 2011. "The New Supply Chain Agenda: A Synopsis and Directions for Future Research." *International Journal of Physical Distribution & Logistics Management* 41(10):940-955.

Thron, T., Nagy, G., and Wassan, N. 2006. "The Impact of Various Levels of Collaborative Engagement on Global and Individual Supply Chain Performance." *International Journal of Physical Distribution & Logistics Management* 36(8):596-620.

Van der Vorst, J. G., and Beulens, A. J. 2002. "Identifying Sources of Uncertainty to Generate Supply Chain Redesign Strategies." *International Journal of Physical Distribution & Logistics Management* 32(6):409-430.

Whipple, J. M., Lynch, D. F., and Nyaga, G. N. 2010. "A Buyer's Perspective on Collaborative Versus Transactional Relationships." *Industrial Marketing Management* 39(3):507-518.

Wilding, R. 1998. "The Supply Chain Complexity Triangle: Uncertainty Generation in the Supply Chain." *International Journal of Physical Distribution & Logistics Management* 28(8):599-616.

Zacharia, Z. G., Nix, N. W., and Lusch, R. F. 2009. "An Analysis of Supply Chain Collaborations and their Effect on Performance Outcomes." *Journal of Business Logistics* 30(2):101-124.

———. 2011. "Capabilities That Enhance Outcomes of an Episodic Supply Chain Collaboration." *Journal of Operations Management* 29(6):591-603.

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Table 1: Initial number of articles from literature search

Journal	ABI/INFORM[a]	Business Source Elite[a]
Decision Sciences	14	15
The International Journal of Logistics Management	27	29
International Journal of Physical Distribution and Logistics Management	36	2
Journal of Business Logistics	20	24
Journal of Operations Management	20	14
Journal of Supply Chain Management	16	15

[a] Keyword search for "collaboration"

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Table 2: Antecedents to supply chain collaboration

Authors	Year	Theory	Type	Antecedents
Frankel, Whipple, and Goldsby	2002	N/A	Case Study	willingness to innovate and change, understanding the other's business, common goals and objectives, appropriate measures and incentives, and information sharing
Simatupang and Sridharan	2005	N/A	Conceptual	common collaborative performance system, information sharing, decision synchronization, incentive alignment, and integrated supply chain processes
Min, Roath, Daugherty, Genchev, Chen, Arndt, and Richey	2006	N/A	Survey, Interview	strategic intent, internal alignment, relationship orientation, relationship specific investment, information flow and communication, and formalization
Fawcett, Magnan, and McCarter	2008	Contingency and Force Field	Literature Review, Interview	management commitment, supply chain mapping and role definition, information sharing and system integration, people management and development, supply chain performance measurement, relationship management and trust building, and rationalization and simplification.
Chen, Tien, Ellinger, and Daugherty	2010	RBV	Survey	top management team championship, 3PL customer service expertise, and guanxi
Hartmann and DeGrahl	2011	RBV	Survey	supply chain partner insight and communication
Zacharia, Nix, and Lusch	2011	KBV and Relational View	Survey	absorptive capacity and collaborative process competence
Fawcett, Fawcett, Watson, and Magnan	2012	Dynamic Capabilities	Interview	competitive environment
Richey, Adams, and Dalela	2012	RBV, TCE	Survey	technological complementarity and flexibility

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Table 3: Supply chain collaboration and performance

Authors	Year	Theory	Type	Summary
Stank, Keller, and Daugherty	2001	N/A	Survey	Internal collaboration had a direct link with logistics service performance. External collaboration had an indirect link with logistics service performance through internal collaboration.
Sinkovics and Roath	2004	N/A	Survey	Collaboration had no significant effect on logistics performance, but did impact market performance.
Corsten and Felde	2005	N/A	Survey	Collaboration had a significant direct effect on innovation and financial performance. Trust and dependence also moderated the relationship in certain scenariors
Min, Roath, Daugherty, Genchev, Chen, Arndt, and Richey	2005	N/A	Interview, Survey	Collaboration positively impacted efficiency, effectiveness, profitability, and reinforcement and expansion of the collaborative relationship.
Sanders	2007	Systems View	Survey	Intra-organizational collaboration had a direct impact on organizational performance. Inter-organizational collaboration had an indirect effect on performance throughintra-organizational collaboration.
Rosenzweig	2009	Relational View and Contingency Theory	Survey	Results indicate supply chain e-collaboration is related to better operational and business performance.
Mishra and Shah	2009	Complementary and RBV	Survey	Authors create a second order construct called collaborative competence from customer, supplier, and internal collaboration components. Collaborative competence had a direct impact on project performance, but its impact on market performance was indirect, mediated through project performance.
Zacharia, Nix, and Lusch	2009	RBV and Relational View	Survey	Collaboration impacts operational and relational outcomes with operational outcomes influencing performance. Collaboration is also moderated by supply chain partner insight and interdependence of knowledge and processes across partners

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Table 3: cont.

Authors	Year	Theory	Type	Summary
Nyaga, Whipple, and Lynch	2010	Relational View, Social Exchange, TCE	Survey	Collaboration impacts trust and commitment and then these variables are linked to performance and relationship satisfaction. A buyer and supplier perspective is utilized.
Allred, Fawcett, Wallin, and Magnan	2011	RBV	Interview, Survey	Collaboration mediates supplier and customer orientation (acts almost as a bridge) to bring the different orientations together impacting productivity and satisfaction which are associated with profitability and growth.
Fawcett, Wallin, Allred,	2011	Dynamic Capabilities, RBV	Survey	Collaboration as a dynamic capability that can impact numerous things dependent on the market environment
Zacharia, Nix, and Lusch	2011	KBV, Relational View	Survey	Collaboration influences operational and relational outcomes
Cao and Zhang	2011	RBV, Relational View, TCE	Survey	Collaborative advantages influences collaborative performance

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Table 4: Supply chain collaboration performance failures

Authors	Year	Theory	Type	Collaborative Performance Inhibitors
Mejias-Sacaluga and Prado-Prado	2002	N/A	Interview	Rigid management structure grading all collaborations on financial performance
Fawcett and Magnan	2002	N/A	Interview, Survey	A lack of internal collaboration preventing the agreed upon external collaboration from performing as specified between firms
Moberg and Speh	2003	N/A	Interview, Survey	Questionable business practices by one or more of the supply chain partners erodes trust and detracts from collaborative performance
Kampstra, Ashayeri, and Gattorna	2006	N/A	Literature Review, Professional Experience	Missing structural elements from time, IT infrastructure, trust, organizational design, competition, fear of external partner pressure, functional powerhouses, and financial reasons can prevent collaborative success
Fawcett, Fawcett, Watson, and Magnan	2012	Dynamic Capabilities	Structured Interview	Missing structural elements from functional silos, poor strategic alignment, insufficient information sharing, resistance to change, insufficient trust, poor alliance management pracitices, and poorly defined roles and responsibilities can prevent collaborative success

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CHAPTER 3: THE IMPACT OF VARIOUS FORMS OF UNCERTAINTY ON SUPPLY CHAIN COLLABORATION AND PERFORMANCE

A paper to be submitted to the *Journal of Business Logistics*

Peter Ralston

3.1 Abstract

Uncertainty can have a definite impact on business operations. Being unable to know things with certainty can change business strategies and limit functional efficiency. Coping with uncertainty is a struggle many firms face. One method to mitigate uncertainty is to collaborate with other firms. Collaboration is a way in which firms share risks, address issues jointly, and utilize each other's knowledge and capabilities in order to remain competitive. Collaboration also allows firms to secure resources which partners control or to which they have access. This lowers search costs while also potentially building trust among the parties over time. However, not all uncertainties are created equal. This paper looks at distinct types of uncertainty, specifically behavioral, environmental, and technological, to gauge their individual relationship with supply chain collaboration. Supply chain collaboration relationships with both financial and operational performance are also analyzed. As a final contribution, the current research also looks to establish boundary conditions around the uncertainty / collaboration relationship by introducing a number of moderators. Analyzing moderating effects provides additional information to researchers and practitioners which may lead to enhanced collaborative success.

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3.2 Introduction

The effects of uncertainty on economic behavior are extensive and pervasive (Williamson, 1973). Uncertainty, broadly defined as an inability to predict future events (Beckman et al., 2004; Chen et al., 2011), can influence business decisions and impact performance outcomes. Some researchers have even concluded that uncertainty is the fundamental issue a firm must combat in order to remain viable in today's business environment (Thompson, 1967; Milliken, 1987; Sutcliffe and Zaheer, 1998). One reason is the negative impact uncertainty can have on a firm's strategic development and operational effectiveness (Porter, 1980). Uncertainty may cause firms to become indecisive or reactionary, slowing market response and competitiveness. Understanding that firms face a number of uncertainties daily (Miller, 1987; Wong et al., 2011), it should be recognized that firms which at least attempt to address uncertainties should receive some benefits over and above other competitors (Coase, 1937; Porter, 1980; Barney, 1991; Williamson, 1991).

One effective method to mitigate uncertainties may be to collaborate with other firms in the supply chain. Supply chain collaboration is defined as a long-term relationship where participants generally cooperate, share information, and work together to plan and even modify their business practices to improve joint performance (Whipple et al., 2010). Collaboration allows firms to coordinate actions. Uncertainty propagates through supply chains (Davis, 1993) and by actively working with other companies, a firm can gain information, efficiencies, improved performance, and a quicker response to market changes (Rindfleisch and Heide, 1997; Fawcett et al., 2011). Given that uncertainty is always present, why do more firms not collaborate to mitigate its negative effects? The answer may lie in understanding that uncertainty comes in many forms, with each having various impact on supply chain collaboration.

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Uncertainty is a broad concept with a number of distinct aspects, each contributing to firm and supply chain decisions differently (Heide and John, 1990). Realizing how to avoid or reduce uncertainty's impact is a challenge firms in a supply chain face (Davis, 1993). Accordingly, a firm's decision to collaborate may be different in the presence of various forms of uncertainty (behavioral, environmental, and technological). Collaborating as a generic response to any form of uncertainty can be costly and not necessarily beneficial (Whipple et al., 2010).

Collaboration does not always live up to expected benefits (Fawcett and Magnan, 2002; Sabath and Fontanella, 2002; Daugherty et al., 2006; Fawcett et al., 2012). Therefore, understanding the factors which lead firms (or preclude them) to collaborate is a valuable exercise. Rooted in forms of uncertainty described by Heide and John (1990), the current research seeks to analyze the impact of behavioral, environmental, and technological uncertainty on supply chain collaboration and also collaboration's impact on firm and operational performance. An additional contribution of the research is provided by understanding if certain constructs moderate specific uncertainty/collaboration relationships. This step creates awareness by establishing boundary conditions (how and why) on the various uncertainty/collaboration relationships (Goldsby et al., 2013). The specific interactions investigated are number of suppliers on the behavioral uncertainty to supply chain collaboration relationship, competitive intensity's effect on environmental uncertainty and supply chain collaboration, as well as R&D spending change on technological uncertainty and supply chain collaboration. Noting if the relationships between uncertainty and collaboration are shaped by certain external or internal moderating factors provides firms a method of further dealing with uncertainty while allowing researchers to better understand the connections between distinct types of uncertainty and supply chain collaboration.

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3.3 Theory

The theoretical underpinning of the current study is transaction cost economics (TCE). TCE is one of the leading perspectives in the study of organizations and collaboration management (David and Han, 2004). Scholarly research has identified an institutional continuum on which transactions occur which range from market exchanges, to collaboration between firms, to vertical integration (Williamson, 1985; Heide and John, 1990; Williamson, 1991; Heide et al., 2007; Nyaga et al., 2010). TCE compares the efficiency of utilizing different institutional forms of exchange (i.e. markets, collaborations, hierarchies) based on transactions costs (Williamson, 1991). TCE is broken into direct and indirect costs with direct costs referring to those associated with the movement of the good or service and indirect costs being those associated with ensuring the function of the transaction (Gulati, 1995). These indirect transactions costs include searching for information, bargaining, securing access to resources, and monitoring (John and Weitz, 1988). Firms identify which institutional form of exchange has the lowest transactions costs and select this form to govern the transfer of goods of a specific process.

The existence of transactions costs are what make the various forms of exchange necessary (Williamson, 1985). Finding the source of transactions costs can provide firms further clues as to what exchange mechanism is appropriate to reduce expenses. While many causes of transactions costs have been speculated, one which receives near unanimous support as a source of transactions costs is uncertainty (Coase, 1937; Williamson, 1979; Heide and John, 1990; Williamson, 1991, 2008; Tadelis and Williamson, 2012).

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Understanding uncertainty's impact on transaction decisions is a necessary exercise (Heide and John, 1990). When the circumstances surrounding an exchange cannot be specified ex ante or when performance cannot be verified ex post; uncertainty exists (Rindfleisch and Heide, 1997). Uncertainty creates a setting where outcomes to decisions are predictions (Milliken, 1987; Sutcliffe and Zaheer, 1998). Uncertainty's presence generates a scenario where deciding "what to do" and "how to do it" sometimes takes precedence over the actual execution of good production or service delivery (Coase, 1937). This indecisiveness may lead to additional transactions costs. Firms may seek more information, scan the marketplace for business necessities such as knowledge or physical resources, and spend more time monitoring competitor and supplier actions (Porter, 1980; John and Weitz, 1988; Rindfleisch and Heide, 1997). As such, firms may spend more money on transactions in conditions of uncertainty, especially those relying on the market form of exchange. Therefore, limiting uncertainty by finding ways to mitigate or share its risks becomes a desired outcome for firms (Davis, 1993). One method this can be achieved is through supply chain management.

Supply chain management is the coordination of the chain of events associated with the movement of goods from raw materials to the end consumer (Mentzer et al., 2001). Effective management of supply chains requires creating synergistic relationships between partners with the objective of maximizing customer value and providing profits to members upstream (Fugate et al., 2006). These synergistic relationships allow firms to link business functions and processes within and across companies into a cohesive and high performing unit (Ellinger et al., 2011). Additionally, these relationships may reduce uncertainty by increasing information sharing, ensuring access to resources controlled by, or capabilities of, collaborators, and a reduction in the bargaining costs of constantly seeking needed inputs on the open market. The long-term nature

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of many collaborative relationships allows firms to account for economic and transactions costs decisions differently than if these partnerships did not exist (Ellram et al., 2008; Whipple et al., 2010). Accordingly, with a substantive focus on exchange, TCE has the ability to explain collaborative governance relationships between firms in a supply chain which come together to deliver goods or services to end consumers (Rindfleisch and Heide, 1997; Williamson, 2008).

3.4 Literature Review and Hypotheses Development

Supply chain collaboration is defined as a long-term relationship where participants generally cooperate, share information, and work together to plan and even modify their business practices to improve joint performance (Whipple et al., 2010). Collaboration allows firms to partner by combining core competencies and expertise without the additional investment of intensive vertical integration (Cao and Zhang, 2011). In collaboration, resources and capabilities of supply chain partners are leveraged to create new capabilities to respond to dynamic market needs (Fawcett et al., 2012). In general, firms should derive more benefits from working together (efficiency, knowledge gain, cost reduction, performance improvement) than individual firms can gain on their own (Daugherty et al., 2006). Additionally, supply chain collaboration may be one way for firms to cope with uncertainty (Davis, 1993).

Collaborative decisions and uncertainty have been discussed before. Fisher (1997) and Lee (2002) discussed collaborative strategies in the face of supply and demand uncertainty. Greater supply chain collaboration should help mitigate supply and demand uncertainties as partners' knowledge and resources are shared to remain efficient and responsive to customer needs (Fawcett and Magnan, 2004). In supply chain collaboration, partners are able to share information and expertise to reduce or eliminate certain types of uncertainty. However, there is a

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large financial cost as well as a number of characteristics (trust, desire and ability to share information, willingness to change processes) that need to occur for collaborations to be successful (Fawcett et al., 2008; Whipple et al., 2010).

Behavioral uncertainty is the degree to which firms are unable to assess the performance of, or sufficiently integrate with, a provider of a given product or service (Grover and Malhotra, 2003; Ellram et al., 2008). Behavioral uncertainty arises from the difficulties in gauging how a partner will achieve performance guarantees or in what manner they will operate to meet them (Williamson, 1985). The current study is interested in behavioral uncertainty of partners before a formal (or informal) collaboration agreement occurs. Thinking of behavioral uncertainty from this ex ante perspective allows us to consider the hesitation or apprehension focal firms may have before collaboration as well as problems of assessing performance pre-relationship, without the costly forms of monitoring and potential opportunism that exists ex post collaborative agreements (Anderson, 1985; Heide and John, 1990; Williamson, 1991; Weitz and Jap, 1995).

Realizing that behavioral uncertainty is omni-present (Skjoett-Larsen et al., 2003), firms may always have some hesitation before collaborating with other parties. There are limitations to the ability of firms to know with certainty how a partner is going to act or perform before actually working with them. The value of collaborative relationships increase when partners feel comfortable with one another (Srinivasan and Brush, 2006) which usually only materializes after some type of working relationship takes place. As such, firms may not be willing to fully invest in collaborative relationships with partners when they are not certain how they will operate or perform (Williamson, 1985; Rindfleisch and Heide, 1997). A common response may be to forego the collaborative opportunity or look towards internally integrating if the exchange perceived to be associated with high levels of potential partner behavioral uncertainty, especially

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if the activity is deemed critical to the firm (Anderson, 1985; Weiss and Anderson, 1992; Jap and Anderson, 2003). Because of this, the following hypothesis is proposed:

H1: Behavioral uncertainty is negatively related to supply chain collaboration.

Another form of uncertainty organizations face is environmental uncertainty. Environmental uncertainty is the degree to which changes occur in the business environment from supply and demand issues, regulatory actions or market shifts (Grover and Malhotra, 2003). There are unanticipated changes in the marketplace to which business must adapt (Heide and John, 1990). Whether an organization is simple or complex, environmental uncertainty is a fundamental issue (Chen and Paulraj, 2004). Explicitly stated, environmental uncertainty causes issues for firms because decisions, demand, events, supplies cannot be predicted with definite accuracy.

Uncertainty diminishes the ability of a firm to function effectively and efficiently. As such, looking for ways to eliminate or reduce uncertainty occurring in the environment is a critical exercise (Davis, 1993). Firms must develop the capability to become aware of, understand, and adapt to as much uncertainty in the marketplace as possible (Srinivasan et al., 2011). As TCE notes, one way to deal with uncertainty when confronted with its presence is to establish relationships with other parties in order to remove all or a portion of it (Williamson, 1991). While traditional TCE research has highlighted that environmental uncertainty results in firms handling transactions (performing a function) internally due to the costs involved in generating a coordinated response to marketplace changes (Williamson, 1985; Grover and Malhotra, 2003; Ellram et al., 2008); there is evidence this perspective is changing. Based on transactions costs, collaboration provides access to different types of information (Whipple et al.,

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2010) which can reduce expense. While environmental uncertainty is not eliminated, greater confidence can be generated for a portion of previously uncertain components. In this regard, TCE declares the benefits of partnership where firms work with other companies to benefit from each other's knowledge and expertise (Paulraj and Chen, 2007). Change is often uncontrollable by individual firms (Mentzer et al., 2000) and collaborating can increase information flow and spread risks between companies. Additionally securing access to needed resources or inputs through collaboration allows a firm to reduce bargaining and search costs present on the open market. Thus the following hypothesis is proposed:

H2: Environmental uncertainty is positively related to supply chain collaboration.

Technological uncertainty is the degree to which product or process technologies in the good or service change (Ragatz et al., 2002). Technology development provides numerous opportunities for firms to apply new technologies and to offer new products or services (Boon-Itt and Wong, 2011). However, maintaining knowledge and understanding of all new technology can be a difficult and expensive task. Closs et al. (1997) noted technology extensions often waste firm resources instead of contributing to the bottom line. Additionally, the sheer volume and pace of technological changes preclude firms from singularly taking advantage of each new opportunity (Autry et al., 2010). There is simply too much technology for most individual firms to keep up with. Rather partnerships may need to develop which will provide access to other firms' knowledge and expertise when it comes to technology (Petersen et al., 2005).

Collaboration across firms in the presence of technological uncertainty can lead to advantages against competitors who choose not to partner (Mason-Jones and Towill, 1997). Transactions costs are reduced from not having to constantly seek new information in regards to

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technology for which a partner is a leader. Additionally collaborative benefits stem from access to new technologies, as well as potential combinative effects of resource and capabilities sharing across partners (Zacharia et al., 2011). In this manner, a firm's experienced technological uncertainty may be leveraged due to the collaborative relationships developed with supply chain partners (Petersen et al., 2005). As such the following hypothesis is offered:

H3: Technological uncertainty is positively related to supply chain collaboration.

While investigating the direct relationships between distinct types of uncertainty and supply chain collaboration is an intended contribution of the article, a number of moderators were also analyzed to gauge their impact on the various uncertainty / collaboration links. The first moderator examined is number of known suppliers for a product or service and its interaction on the relationship between behavioral uncertainty and supply chain collaboration is discussed.

Celly and Frazier (1996) indicated a limited number of potential suppliers (partners) may allow firms to gauge a broad idea of abilities and performance across suppliers. Market conditions and firm purchasing practice have the ability to limit the effective supplier set for a given product or service to an organization (Kauffman and Popkowski Leszczyc, 2005). These factors along with a firm's limited knowledge of which suppliers actually exist may serve as a filter to deliver a specific supplier set (Spekman, 1988). This defined supplier set may provide firms a general expectation of supplier conduct and performance. Performance assessment or monitoring ex ante would then become less costly. Performance evaluation is either confined to a limited number of potential partners or does not even need to occur (Rindfleisch and Heide, 1997).

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Accordingly, number of suppliers may be able to attenuate the predicted negative relationship between behavioral uncertainty and supply chain collaboration because a basic idea of offering and conduct has been generated. This stems from understanding a defined set of possible partners will allow firms a clearer perspective of what to expect with potential collaborators (Celly and Frazier, 1996). Therefore, the following hypothesis is presented:

H4: The negative relationship between behavioral uncertainty and supply chain collaboration will be lessened when moderated by known number of suppliers.

Competitive intensity reflects the market pressure faced by a firm in the main industry of the products or services offered (Mahapatra et al., 2012). The interaction of competitive intensity between environmental uncertainty and supply chain collaboration is investigated because of the severe effects competitive intensity can have on firm decisions. For instance, in the absence of competition, an organization may serve as customers only choice and act differently in the presence of various forms of uncertainty (Kohli and Jaworski, 1990). By contrast, under conditions of intense competition several alternatives exist for consumers causing firms to seek heterogeneous advantages over their competitors (Jaworski and Kohli, 1993). In other words, competition requires firms to seek coping mechanisms.

Davis (1993) suggested industries with high competitive intensity may see member firms collaborate. Successful collaboration has inimitable qualities as each relationship has distinct characteristics based on partner composition (Fawcett et al., 2012). In this sense, collaboration can help firms differentially compete in a competitive environment. Accordingly, competitive intensity may provide an additional stimulate to collaborate over and above the presence of environmental uncertainty (Ang, 2008). From a TCE perspective this can be due to acquiring

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information or securing access to resources which may aid in mitigating environmental uncertainty as well as offer an advantage over competitors. As firms face greater competition, the idea of securing access to resources or capitalizing on partner capabilities may be intensified in the presence of environmental uncertainty. Thus, the following is proposed:

H5: The positive relationship between environmental uncertainty and supply chain collaboration will be strengthened when moderated by competitive intensity.

The final moderator investigated is on the interaction of Research and Development (R&D) spending on the relationship between technological uncertainty and supply chain collaboration. R&D spending as a percent of sales can represent a proxy for technological investment and ability to innovate (Balkin et al., 2000; Sher and Yang, 2005). Additionally, Cohen and Levinthal (1989) argued that R&D spending not only helps generate new information which can lead to potential innovation, but also enhances the firm's ability to assimilate and exploit existing information. As such, R&D spending may signal that a firm faces less technological uncertainty because of an increased effectiveness at processing and capitalizing on information. In this instance, the transactions costs of seeking more information from potential partners may not be worth the investment of seeking out the small percentage of collaborators that have a higher knowledge of new technology than the original firm. Correspondingly, R&D spending may lessen the positive relationship technological uncertainty is predicted to have with supply chain collaboration. Thus, the following hypothesis is proposed:

H6: The positive relationship between technological uncertainty and supply chain collaboration will be lessened when moderated by R&D spending.

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Supply chain collaboration has positive benefits to supply chains and individual firms (Daugherty, 2011). Arguably, increased coordination, information sharing, and joint effort should lead to both improved supply chain and firm performance (Richey et al., 2010). A firm's decision to collaborate is a signal that the firm believes economic gain can be achieved through the partnership. These gains can be due to reducing searching and bargaining costs (Rindfleisch and Heide, 1997). Additionally, collaborations may result in goods or services that lead to competitive advantages (Jap, 1999). These advantages can generate improved sales, revenues, and profits. As such, supply chain collaboration should result in improved financial standing. Thus the following hypothesis is offered:

H7: Supply chain collaboration is positively related to financial performance.

While financial benefits may exist from supply chain collaboration, so to may operational benefits (Ellram et al., 2008). Collaboration can lead to activities being completed in a cooperative and coordinated manner (Heide and John, 1990; Richey et al., 2012). This coordination can lead to operational efficiencies and enhancement (Bowersox et al., 1999). Better on-time delivery, improved inventory management, greater responsiveness, and enhanced quality may all be effects of supply chain collaboration (Flynn et al., 2010; Grawe et al., 2011; Richey et al., 2012). Therefore, supply chain collaboration may play a role in improving firm operational performance. The following hypothesis is proposed:

H8: Supply chain collaboration is positively related to operational performance.

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3.5 Research Methodology

3.5.1 Data Collection

Data utilized in the current research was gathered from a survey designed by following Dillman's (2000) recommended guidelines. Multi-item reflective measures were adapted from previous research to evaluate the majority of the selected constructs (R&D expenditures and number of suppliers were single item questions) (Churchill Jr., 1979). A preliminary draft of the survey was reviewed by 8 supply chain management educators and 4 supply chain executives. Each expert was asked to evaluate the measures and survey draft for representativeness, clarity, content validity, and face validity. After receiving the experts' feedback, refinements were made to improve the overall quality of the questionnaire. The items, means, standard deviations, Cronbach Alpha's, and scale source are located in the appendix.

Data for the current study was acquired by utilizing panel respondents from SurveyMonkey. Potential survey respondents are broadly classified by SurveyMonkey after answering numerous demographic, occupational, and geographical questions. Researchers then have the ability to refine the selection criteria based on designated profile characteristics. Accessing members from existing online survey panels has become a tool more often utilized by academic researchers (Autry et al., 2010; Grawe et al., 2011; Ralston et al., 2013). The pool of potential respondents for this project consisted of decision makers from U.S. firms that routinely work with suppliers or supply chain partners to provide goods or services to consumers. Survey participants were required to identify job category information and those who either did not select, or provided job categories functions outside the scope of the survey, were not allowed to complete the questionnaire. Finally, two screening questions were located at the end of the

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survey. The first was "the questions in this survey are relevant to my firm" and the second was "I had enough information to answer all of the questions in the survey", (1 = Strongly Disagree, 4 = Neutral, and 7 = Strongly Agree). Responses of 4 or lower from either of the questions were dropped from the analysis. After initially receiving 432 completed surveys, 195 were eliminated based on the screening questions. This resulted in a usable sample of 237 surveys.

Non-response bias was assessed by comparing the responses of early versus late respondents. Armstrong and Overton (1977) noted some potential similarities between late responders to surveys and non-respondents. In this case, late respondents act as a proxy to represent non-respondents. No statistically significant differences were found between the early and late respondent group. Therefore, non-response bias is not viewed as a serious concern in our sample.

Common methods bias (CMB) is considered a threat to the validity of findings from survey research and represents potential error by using a single respondent to answer all items of interest within a single survey (Podsakoff and Organ, 1986; Podsakoff et al., 2003). A variety of approaches were taken to analyze CMB to ensure it had no serious impact on the study results. First, likert scales ranges amongst the latent variables within our questionnaire varied from 5 to 7 points. Podsakoff et al. (2012) advocated this as one technique to limit CMB. Next a Harman's single factor test was completed for the items in the study (Harman, 1976). If all measurement items across the latent variables in the study were to load onto one exploratory factor, or one factor accounted for more than 50% of the explained variance, CMB would be assumed to be significantly impacting study results. An exploratory factor analysis was performed with eight identified factors above the eigenvalue greater than 1.0 criterion. The eight factors explained 66% of the explained variance, with the largest single factor accounting for only 29% of the

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variance. Based on these results, we feel CMB is not of a serious concern to our results. A final test for CMB was performed using Lindell and Whitney's (2001) marker variable technique. In this analysis, the smallest correlation between an a priori, theoretically unrelated marker variable assessing self-confidence and a latent construct within the theoretical model was used to represent CMB. This marker variable correlation was then partialled out from the constructs of interest to see if the remaining relationship between constructs was still significant without the presence of the method bias. A majority of the remaining correlations remained significant, indicating CMB did not play a significant role in our findings.

3.5.2 Measurement Item Development

A mixture of five-point and seven-point Likert scales were used for all scale items. Additionally, all items were adapted from previous scales. Behavioral uncertainty items were drawn from Kwon and Suh (2004) and Chandler et al. (2009). Respondents were asked to indicate their agreement in regards to their firm's ability to predict the performance and adaptability of existing supply chain partners before entering into a relationship with them. Three measurement items were used; the mean responses ranged from 2.99 to 3.24 (1 = Strongly Disagree, 3 = Neutral, and 5 = Strongly Agree), indicating moderate levels of behavioral uncertainty among the firms.

Environmental uncertainty items were adapted from Koberg (1987) and DeSarbo et al. (2005). Respondents were asked to indicate their agreement in regards to the market environment and the firm's primarily offered product(s) or service(s). Three measurement items returned mean responses ranging from 3.12 to 3.39 (1 = Strongly Disagree, 3 = Neutral, and 5 =

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Strongly Agree), indicating moderate to slightly higher levels of environmental uncertainty among the firms.

Technological uncertainty items were adapted from DeSarbo et al. (2005) and Autry et al. (2010). Respondents were asked to indicate their agreement in regards to technology within the primary industry their firm competes. Four measurement items were utilized. The mean responses ranged from 3.61 to 4.11 (1 = Strongly Disagree, 3 = Neutral, and 5 = Strongly Agree), indicating moderate to high levels of technological uncertainty among the firms.

Supply chain collaboration items were drawn from Stank et al. (2001a). Respondents were asked to indicate their level of agreement in regards to collaborational elements between their firm and supply chain partner. Five measurement items were used with responses ranging from 4.88 to 5.25 (1 = Strongly Disagree, 4 = Neutral, and 7 = Strongly Agree), indicating slightly higher levels of supply chain collaboration among the firms.

Three different moderators were used to further analyze the relationship between specific types of uncertainty and supply chain collaboration. The number of suppliers was captured to assess the interaction between behavioral uncertainty and supply chain collaboration. Respondents were asked to indicate the number of different partners available for the product or service offered by the current supply chain partner. A five point likert scale question was created (1 = One supplier, 2 = Two to Four Suppliers, 3 = Five to Seven Suppliers, 4 = Eight to Ten Suppliers, 5 = > 10 Suppliers). The mean response was 2.87 indicating that a majority of the firms were aware of Five to Seven potential supply chain partners. R&D spend as a percent of previous fiscal year's sales was captured to assess the interaction between technological uncertainty and supply chain collaboration (1 = < 1%, 2 = 1% - 2.99%, 3 = 3% - 4.99%, 4 = 5% -

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6.99%, 5 = 7% or greater). The mean response was 3.23 indicating a majority of the firms spent between 3% – 4.99% on R&D as a percent of sales. Finally, competitive intensity items were drawn from Jaworski and Kohli (1993). Competitive intensity was captured to further investigate the interaction between environmental uncertainty and supply chain collaboration. Respondents were asked to indicate the competitive nature of the industry in which their firm primarily competes. Three items were utilized with mean responses ranging from 4.75 to 5.56 (1 = Strongly Disagree, 4 = Neutral, and 7 = Strongly Agree), indicating slightly higher to high levels of competitive intensity in the industries within which the firms participate.

Both financial and operational measures were gathered using a seven point likert scale (1 = much worse, 4 = neutral, and 7 = much better). Financial performance was measured using six items adapted from Flynn et al. (2010). Respondents were asked to judge their firm's performance against stated objectives of the firm on sales and financial metrics. Operational performance items were drawn from Grawe et al. (2011). Similar to financial performance, respondents were asked to grade their firm's performance against stated firm objectives for a number of operational characteristics.

Additionally, years of full time work experience and firm sales were utilized as control variables in the analysis. Full-time work experience was utilized to ensure that tenure with full time jobs did not significantly impact the study's results. Firm sales figures were used as a proxy for firm size and was utilized to control for differences in size between companies. Neither of the control variables investigated significantly impacted the study's results.

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3.5.3 Analysis

The researchers followed the two-step model analysis approach advised by Anderson and Gerbing (1988). A confirmatory factor analysis (CFA) was used to evaluate the measurement items. After results supported the conceptual model, structural equation modeling was used to analyze the hypothesized relationships between constructs. All statistical analyses were completed in SPSS and Amos Version 19.

3.5.4 Measurement model

Convergent validity of the constructs was assessed by analyzing the standardized factor loadings of each measurement item and the average variance extracted (AVE) of each construct. Factor loadings ranged from .58 to .89 for the constructs. With the loadings returned being greater than .50, convergent validity within each construct is supported (Hair et al., 2006). AVE indicates the amount of variance captured relative to error variance by the constructs. The suggested minimum threshold is .50 (Fornell and Larcker, 1981). All constructs returned AVEs above .50, except for Environmental Uncertainty, which had an AVE of .46. Considering the factor loadings of the construct (all above .50), as well as the overall conceptual model and actual model fit statistics, the Environmental Uncertainty construct was allowed to remain in the model for further analysis. Discriminant validity aids in determining whether or not constructs are distinctly represented in the measurement model. Discriminant validity can be assessed by comparing the square root of a constructs AVE to the interitem correlation between pairs of constructs (Fornell and Larcker, 1981). If the square root value of the AVE is greater than the correlations, discriminant validity is indicated. Only one construct pair, operational and financial performance, was returned under the threshold for this conservative test (Hatcher, 1994). One

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may assume a fairly high relationship between operational and financial performance however, a chi-square difference test was run to ensure these two constructs represented distinct concepts (Anderson and Gerbing, 1988). The chi-square difference test, which constrains the correlation between operational and financial performance to 1, was compared to the original measurement model. The difference in chi-square was statistically significant indicating that the constructs are distinct. Reliability analyses were performed by assessing the Cronbach's Alpha of each construct (Cronbach, 1951). All Cronbach's Alpha measures returned were above the .70 threshold indicating our constructs consistently measure what was intended (Nunnally and Bernstein, 1994).

The data sufficiently fit the measurement model (X^2/D.F. = 1.90, CFI = .93, TLI = .92, RMSEA = .060). Each index falls within acceptable model ranges and indicate adequate fit (Iacobucci, 2010). These findings, along with evidence of construct validity and reliability, allow us to move to the second phase of analysis which includes evaluating the structural model proposed in the current project.

3.6 RESULTS

Four different structural models were analyzed. One structural model contained the direct relationships between each type of uncertainty and supply chain collaboration, along with supply chain collaboration's relationship with both financial and operational performance. Separately, three additional structural models were analyzed, with each containing one of the hypothesized moderated effects. This step was followed to eliminate confounding effects and to receive a clear indication of how each specific moderated relationship impacted the theorized model.

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The first structural model with direct relationships indicated adequate structural model fit (X^2/D.F. = 1.94, CFI = .93, TLI = .92, RMSEA = .062) (Iacobucci, 2010). Hypothesis one predicted a negative relationship between behavioral uncertainty and supply chain collaboration. The returned path coefficient was negative (-.06), but was insignificant indicating behavioral uncertainty had no impact on supply chain collaboration. Hypothesis two predicted a positive relationship between environmental uncertainty and supply chain collaboration. The reported path coefficient was positive (.09), but was also insignificant. This result indicates that environmental uncertainty has little effect on supply chain collaboration. Hypothesis three predicted technological uncertainty would share a positive relationship with supply chain collaboration. The path coefficient returned was positive (.566) and statistically significant at the $p<.001$ level indicating technological uncertainty does have an impact on supply chain collaboration. Hypotheses seven and eight predicted supply chain collaboration would positively impact both financial and operational performance. The path coefficient between supply chain collaboration and financial performance was .656 ($p<.001$) and supply chain collaboration and operational performance was .646 ($p<.001$). These results indicate supply chain collaboration does impact both financial and operational performance. The R-squared values for the endogenous constructs in the model were as follows: supply chain collaboration was .34, financial performance was .43, and operational performance was .42.

Hypothesis four predicted that the proposed negative relationship between behavioral uncertainty and supply chain collaboration would be lessened by the number of suppliers the firm was aware which offered similar products or services. The moderated path coefficient was positive (.29) and statistically significant at the $p < .001$ level indicating the number of suppliers does mitigate behavioral uncertainty's relationship with supply chain collaboration. Hypothesis

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five predicted competitive intensity would further strengthen the relationship between environmental uncertainty and supply chain collaboration. The moderated path coefficient returned was positive (.25) and statistically significant at the $p < .05$ level. This indicates that the competitive intensity faced by a firm does impact the relationship environmental uncertainty has with supply chain collaboration. Finally, hypothesis six predicted R&D spend by a firm would lessen the impact technological uncertainty shared with supply chain collaboration. The returned path coefficient (.121) was partially significant ($p<.10$) indicating R&D spend may not impact the relationship between technological uncertainty and supply chain collaboration. The model results can be found by referring to table 7.

3.7 Discussion and Implications:

Firm boundaries are becoming more permeable as companies focus on core competencies and rely on others for the additional skills and capabilities needed to meet customer demands (Ellram et al., 2008; Zacharia et al., 2009). As such, understanding what impact market factors have on collaboration is a needed exercise. This study investigates one type of market factor, specifically uncertainty, and its various forms on the supply chain collaboration decision. Understanding these relationships has numerous implications for firms, supply chains, and other researchers. As the current research extends previous work on the impact of uncertainty on collaboration (Heide and John, 1990; Sutcliffe and Zaheer, 1998; Vickery et al., 2003; Nyaga et al., 2010), the study differentiates itself by types of uncertainty investigated, business context, and/or the moderated relationships between identified factors and specific uncertainty / collaboration relationships.

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The study's results suggest that distinctions are made between types of uncertainty and that each type has a heterogeneous impact on supply chain collaboration. This finding supports similar results reported by Heide and John (1990) and Sutcliffe and Zaheer (1998). An important take-away from the study is that managers still have the ability to distinguish between different types of uncertainty. Each type has its own impact on the collaboration decision which is important for researchers to consider as supply chain relationships continue to be pursued by practitioners and analyzed by researchers.

Behavioral uncertainty's negative relationship with supply chain collaboration was predicted. Although the result was not statistically significant, being unable to predict the performance of a partner should limit potential supply chain collaboration. However, the behavioral uncertainty / collaboration link was positively and statistically significantly moderated by the number of suppliers. In other words, the number of providers for a given product or service a firm was aware of did play a mitigating role in the relationship between behavioral uncertainty and supply chain collaboration. The average number of suppliers a firm was aware of fell between 5-7 firms. This indicates that a firm with a defined supplier set actual sees behavioral uncertainty as having a positive effect on supply chain collaboration. This may stem from the fact that an organization is taking their chances with a particular partner because there are other options. Alternatively, because there is a defined supplier set and a firm feels it has a general understanding of how potential partners should operate and perform; one can be selected and a collaboration can begin. While determining the reason why a defined number of suppliers moderates the behavioral uncertainty and supply chain collaboration link requires further investigation, knowing that it does allows researchers the opportunity to think about behavioral uncertainty and collaboration differently. As a starting point, the result indicates

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firms should learn about the set of suppliers for an important product or service before selecting one with which to collaborate. There may be some type of learning or knowledge acquisition effect present which helps mitigate the negative consequences of behavioral uncertainty on supply chain collaboration.

Environmental uncertainty was predicted to share a positive relationship with supply chain collaboration. While the relationship was not statistically significant, the relationship was positive. Being unsure of events in the environment stemming from supply and demand issues, competitive factors, and regulatory issues should lead firms to collaborate as they look to diversify their interests and spread risks (Nyaga et al., 2010). However, the relationship between environmental uncertainty and collaboration was significantly moderated by competitive intensity. Knowing how intense competition is within the industry may provide the impetus for firms to look for collaboration and not necessarily simply the external environment. In this regard ex ante environmental uncertainty and behavioral uncertainty as investigated in the current study are similar in that they alone do not push firms towards or away from collaboration. This makes sense as behavioral and environmental uncertainty should cause firms hesitation, not necessarily defined action. Rather because of the unpredictable nature of both behavioral and environmental uncertainty, the presence of these factors indicate firms should proceed with caution and not programmatic responses of collaboration with supply chain partners. As the results indicate because environmental uncertainty exists, supply chain collaboration does not necessarily have to follow.

Technological uncertainty was predicted and did share a positive, significant relationship with supply chain collaboration. If certain technological knowledge is unknown, or technology changes rapidly, it makes sense to share this burden and expense with others. Having partners

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more experienced with a certain type of technology, or the economies of scale, to be on the forefront of technology changes is a way to limit investment and allow for focal firms to focus on their core competencies. R&D expenditures was predicted to negatively moderate the relationship technological uncertainty shared with supply chain collaboration; however, results returned a partially significant relationship. Thinking more fully on this result indicates that a firm with higher R&D expenditures may already be aware of the technological changes and pace within the industry. Additionally, a firm with higher R&D investments may be tech savvy, which would mitigate or lessen the impact of technological uncertainty on collaboration. In other words, there may not be as much of a need to collaborate when R&D expenses are high, even in the presence of technological uncertainty.

From a research perspective, distinguishing uncertainty types provides researchers a new way to think about uncertainty ex ante. Findings indicate that behavioral and environmental uncertainty did not share a statistically significant relationship with supply chain collaboration. However, the moderated effect of number of suppliers on the behavioral uncertainty to supply chain collaboration as well as the moderated impact of competitive intensity on environmental uncertainty and supply chain collaboration makes the specified uncertainty / collaboration relationships become significant. This helps establish the how and why of the uncertainty / collaboration relationship and creates boundary conditions for researchers (and practitioners) to be aware of (Goldsby et al., 2013). Additionally, the moderated findings help further explain TCE by showing uncertainty can in fact lead to collaboration under certain circumstances. TCE traditionally states that uncertainty leads to a hierarchical (internal) form of governance. The current studies results show that this is not always the case.

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Practitioners should acknowledge the different forms of uncertainty because it will distinctly impact their collaborative decisions. Additionally, recognizing that the number of suppliers, competitive intensity of the industry, and R&D expenditures can moderate uncertainty collaboration relationships, strategic decisions may be needed for the added benefits of these environmental scanning, or investments in, capabilities. That collaboration can positively impact operational and financial performance further highlights the importance of, and the active managing needed for, supply chain collaborations.

One further thing to mention is the potential value of uncertainty to focal firms and collaborative partners as a solidifying force to inter-organizational relationships. Previous research on collaborations shows technology and personal relationships can lead to business relationships (Fawcett and Magnan, 2002; Sanders and Premus, 2005; Fawcett et al., 2008; Whipple et al., 2010; Sanders et al., 2011). Technology such as electronic data interchange or enterprise resource planning systems are automated processes which oftentimes do not require human interaction. Personal relationships which lead to business partnerships are good, but this foundational relationship can be lost due to retirements, promotions, or firing/new positions within new companies. In a way the companies do not own the basis for the relationship; rather, individual employees do. Uncertainty can actually act as a way for firms to develop a relationship which is to the benefit of businesses, and not derived from individuals or through technological processes. Focal firms and partners can look at environmental uncertainty as something that the companies can face together. Those businesses which face technological uncertainty can be sold on the expertise and experience of partners through reputation and performance. Behavioral uncertainty is actually something potential partners can address. This can be done through consistency of actions and performance. Make focal firms salient to the fact

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that you are an "open book". Your firm acts and performs in a certain manner. Instead of being afraid of uncertainty, the concept is something that could be attacked by firms.

3.8 Limitations and Future Directions:

As with most survey research, the respondents provide individual opinions at a single point of time. With efforts made to qualify respondents, we assume the validity of the results; but recognize that future research from a longitudinal perspective would also be beneficial. Analyzing moderators on uncertainty / collaboration relationships is a means for establishing the how and why of these links. Identifying additional moderators to these relationships would be valuable. For example, looking at transaction frequency on the behavioral uncertainty supply chain collaboration relationship may be useful. Transaction frequency would assume that a high level of transactions may actually lessen the relationship between behavioral uncertainty and supply chain collaboration. This could be due to the speed with which partners will become familiar with one another implying that knowledge gained of each other's processes will happen quickly. Additionally fully assessing the impact of the number of suppliers on the behavioral uncertainty / collaboration link would be helpful. Determining if the number of suppliers from a numbers perspective or whether just having a defined opportunity set is the reason for the impact on the relationship deserves further attention.

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3.9 Appendix: Scale Items

Construct	Label	Item	Mean	Standard Deviation	Cronbach's Alpha	Adapted From
Behavioral Uncertainty						
To what extent do you agree/disagree with the following statements in regards to your firm and this supply chain partner. Respondents instructed to think about a relationship their firm shares with its most important supply chain partner (1 = Strongly Disagree, 3 = Neither Agree Nor Disagree, 5 = Strongly Agree).					0.79	Kwon and Suh (2004) Chandler et al. (2009)
	BU1	Before entering into a relationship with this partner, it was difficult to monitor whether they were performing well	2.99	1.07		
	BU2	Before entering into a relationship with this partner, we did not know if this supply chain partner would adapt quickly should we change our specifications on short notice	3.24	1.13		
	BU3	Before entering into a relationship with this partner, we were unable to predict how they may perform in the future	3.24	1.12		
Environmental Uncertainty						
To what extent do you agree/disagree with the following statements in regards to your firm and its primary products or services (1 = Strongly Disagree, 3 = Neither Agree Nor Disagree, 5 = Strongly Agree).					0.71	Koberg (1987) DeSarbo et al. (2005)
	EU1	It is difficult to predict changes in the marketplace for the products or services we sell	3.19	1.05		
	EU2	The regulatory environment in which my firm competes is unpredictable	3.12	1.22		
	EU3	Customer demand is not easy to forecast for the products or services my firm sells	3.39	1.07		
Technological Uncertainty						
To what extent do you agree/disagree with the following statements in regards to your firm's primary industry (1 = Strongly Disagree, 3 = Neither Agree Nor Disagree, 5 = Strongly Agree).					0.82	DeSarbo et al. (2005) Autry et al. (2010)
	TU1	Technology in our industry is rapidly changing	4.04	0.87		
	TU2	Technological advancements provide big opportunities in our industry	4.11	0.86		
	TU3	Technological developments in our industry are major	3.82	1.00		
Number of Suppliers					N/A	N/A
	SUP	Before entering into a relationship with this partner, how many different suppliers were you aware of for the products or services this partner delivers (1 = 1, 2 = 2-4, 3 = 5-7, 4 = 8-10, 5 = >10)	2.87	1.02		
Competitive Intensity						
To what extent do you agree/disagree with the following statements in regards to your firm's primary industry (1 = Strongly Disagree, 4 = Neither Agree Nor Disagree, 7 = Strongly Agree).					0.75	Jaworski and Kohli (1993)
	CI1	Competition in our industry is fierce	5.56	1.36		
	CI2	There are many promotion wars in our industry	4.75	1.65		
	CI3	Price competition is a hallmark of our industry	5.36	1.42		

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Scale items cont.

R&D Spend				N/A	N/A
RD	What was your firm's R&D spending last fiscal year as a percentage of sales (1 = less than 1%, 2 = 1% to 2.99%, 3 = 3% - 4.99%, 4 = 5% - 6.99%, and 5 = 7% or greater)?	3.23	1.15		
Supply Chain Collaboration					
To what extent do you agree/disagree with the following statements in regards to your firm and this supply chain partner. Respondents instructed to think about a relationship their firm shares with its most important supply chain partner (1 = Strongly Disagree, 4 = Neither Agree Nor Disagree, 7 = Strongly Agree)				0.83	Stank et al. (2001)
SCC1	My firm has developed performance measures that incorporate the performance of this supply chain partner	5.17	1.27		
SCC2	My firm experiences improved performance by integrating operations with this supply chain partner	5.23	1.25		
SCC3	My firm has a supply chain arrangement with this partner that operates under the principle of shared rewards and risks	4.88	1.54		
SCC4	My firm has increased operational flexibility through our relationship with this supply chain partner	5.25	1.20		
SCC5	My firm benchmarks best practices/processes and shares results with this supply chain partner	5.07	1.47		
Financial Performance					
Please indicate your firm's performance against stated objectives of the firm in the following areas (1 = Much Worse, 4 = Same As, 7 = Much Better)				0.95	Flynn et al. (2010)
FP1	Pre-Tax Return on Assets	4.94	1.10		
FP2	Return on Investment	5.17	1.24		
FP3	Growth in Return on Investment	5.16	1.26		
FP4	Growth in Sales	5.28	1.25		
FP5	Return on Sales	5.17	1.18		
FP6	Growth in Return on Sales	5.24	1.21		
Operational Performance					
Please indicate your firm's performance against stated objectives of the firm in the following areas (1 = Much Worse, 4 = Same As, 7 = Much Better)				0.87	Grawe et al. (2011)
OP1	On-Time Delivery	5.43	1.06		
OP2	Inventory Turnover	5.30	1.20		
OP3	Customer Satisfaction	5.59	1.11		
OP4	Low Damage Levels	5.31	1.23		
OP5	Order Cycle Time Variability	5.23	1.17		

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3.10 References

Anderson, E. 1985. "The Salesperson as Outside Agent or Employee: A Transaction Cost Analysis." *Marketing Science* 4(3):234-254.

Anderson, J. C., and Gerbing, D. W. 1988. "Structural equation modeling in practice: A review and recommended two-step approach." *Psychological Bulletin* 103(3):411-423.

Ang, S. H. 2008. "Competitive Intensity and Collaboration: Impact on Firm Growth Across Technological Environments." *Strategic Management Journal* 29(10):1057-1075.

Armstrong, J. S., and Overton, T. 1977. "Estimating Nonresponse Bias in Mail Surveys." *Journal of Marketing Research* 14(3):396-402.

Autry, C. W., Grawe, S. J., Daugherty, P. J., and Richey, R. G. 2010. "The Effects of Technological Turbulence and Breadth on Supply Chain Technology Acceptance and Adoption." *Journal of Operations Management* 28(6):522-536.

Balkin, D. B., Gideon, D. M., and Gomez-Mejia, L. R. 2000. "Is CEO Pay in High-Technology Firms Related to Innovation?" *The Academy of Management Journal* 43(6):1118-1129.

Barney, J. B. 1991. "Firm Resources and Sustained Competitive Advantage." *Journal of Management* 17(1):99-120.

Beckman, C. M., Haunschild, P. R., and Phillips, D. J. 2004. "Friends or Strangers? Firm-Specific Uncertainty, Market Uncertainty, and Network Partner Selection." *Organization Science* 15(3):259-275.

Boon-Itt, S., and Wong, C. Y. 2011. "The Moderating Effects of Technological and Demand Uncertainties on the Relationship Between Supply Chain Integration and Customer Delivery Performance." *International Journal of Physical Distribution & Logistics Management* 41(3):253-276.

Bowersox, D. J., Closs, D. J., and Stank, T. P. 1999. *21st Century Logistics: Making Supply Chain Integration a Reality*. Oak Brook, IL: Council of Logistics Management.

Cao, M., and Zhang, Q. 2011. "Supply Chain Collaboration: Impact on Collaborative Advantage and Firm Performance." *Journal of Operations Management* 29(3):163-180.

Celly, K. S., and Frazier, G. L. 1996. "Outcome-Based and Behavior-Based Coordination Efforts in Channel Relationships." *Journal of Marketing Research* 33(2):200-210.

Chandler, G. N., McKelvie, A., and Davidsson, P. 2009. "Asset specificity and Behavioral Uncertainty as Moderators of the Sales Growth—Employment Growth Relationship in Emerging Ventures." *Journal of Business Venturing* 24(4):373-387.

www.manaraa.com

Chen, H., Ellinger, A. E., and Tian, Y. 2011. "Manufacturer–Supplier Guanxi Strategy: An Examination of Contingent Environmental Factors." *Industrial Marketing Management* 40(4):550-560.

Chen, I. J., and Paulraj, A. 2004. "Towards a Theory of Supply Chain Management: The Constructs and Measurements." *Journal of Operations Management* 22(2):119-150.

Churchill Jr., G. A. 1979. "A Paradigm for Developing Better Measures of Marketing Constructs." *Journal of Marketing Research* 16(1):64-73.

Closs, D. J., Goldsby, T. J., and Clinton, S. R. 1997. "Information technology influences on world class logistics capability." *International Journal of Physical Distribution and Logistics Management* 27(1):4-17.

Coase, R. H. 1937. "The Nature of the Firm." *Economica* 4(16):386-405.

Cohen, W. M., and Levinthal, D. A. 1989. "Innovation and Learning: The Two Faces of R & D." *The Economic Journal* 99(397):569-596.

Cronbach, L. J. 1951. "Coefficient Alpha and the Internal Structure of Tests." *Psychometrika* 16(3):297-334.

Daugherty, P. J., Richey, R. G., Roath, A. S., Min, S., Chen, H., Arndt, A. D., and Genchev, S. E. 2006. "Is Collaboration Paying Off for Firms?" *Business horizons* 49(1):61-70.

Daugherty, P. J. 2011. "Review of Logistics and Supply chain Relationship Literature and Suggested Research Agenda." *International Journal of Physical Distribution & Logistics Management* 41(1):16-31.

David, R. J., and Han, S.-K. 2004. "A Systematic Assessment of the Empirical Support for Transaction Cost Economics." *Strategic Management Journal* 25(1):39-58.

Davis, T. 1993. "Effective Supply Chain Management." *Sloan Management Review* 34(4):35-45.

DeSarbo, W. S., Anthony Di Benedetto, C., Michael, S., and Sinha, I. 2005. "Revisiting the Miles and Snow Strategic Framework: Uncovering Interrelationships Between Strategic Types, Capabilities, Environmental Uncertainty, and Firm Performance." *Strategic Management Journal* 26(1):47-74.

Dillman, D. A. 2000. *Mail and Web Based Survey: The Tailored Design Method.* New York: Wiley.

Ellinger, A. E., Natarajarathinam, M., Adams, F. G., Gray, J. B., Hofman, D., and O'Marah, K. 2011. "Supply Chain Management Competency and Firm Financial Success." *Journal of Business Logistics* 32(3):214-226.

www.manaraa.com

Ellram, L. M., Tate, W. L., and Billington, C. 2008. "Offshore Outsourcing of Professional Services: A Transaction Cost Economics Perspective." *Journal of Operations Management* 26(2):148-163.

Fawcett, S. E., and Magnan, G. M. 2002. "The Rhetoric and Reality of Supply Chain Integration." *International Journal of Physical Distribution & Logistics Management* 32(5):339-361.

———. 2004. "Ten Guiding Principles for High-Impact SCM." *Business Horizons* 47(5):67-74.

Fawcett, S. E., Magnan, G. M., and McCarter, M. W. 2008. "A Three-Stage Implementation Model for Supply Chain Collaboration." *Journal of Business Logistics* 29(1):93-112.

Fawcett, S. E., Wallin, C., Allred, C., Fawcett, A. M., and Magnan, G. M. 2011. "Information Technology as an Enabler of Supply Chain Collaboration: A Dynamic Capabilities Perspective." *Journal of Supply Chain Management* 47(1):38-59.

Fawcett, S. E., Fawcett, A. M., Watson, B. J., and Magnan, G. M. 2012. "Peeking Inside the Black Box: Toward an Understanding of Supply Chain Collaboration Dynamics." *Journal of Supply Chain Management* 48(1):44-72.

Fisher, M. L. 1997. "What is the Right Supply Chain for your Product?" *Harvard Business Review* 75:105-117.

Flynn, B. B., Huo, B., and Zhao, X. 2010. "The Impact of Supply Chain Integration on Performance: A Contingency and Configuration Approach." *Journal of Operations Management* 28(1):58-71.

Fornell, C., and Larcker, D. F. 1981. "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error." *Journal of Marketing Research* 18(1):39-50.

Fugate, B., Sahin, F., and Mentzer, J. T. 2006. "Supply Chain Management Coordination Mechanisms." *Journal of Business Logistics* 27(2):129-161.

Goldsby, T. J., Michael Knemeyer, A., Miller, J. W., and Wallenburg, C. M. 2013. "Measurement and Moderation: Finding the Boundary Conditions in Logistics and Supply Chain Research." *Journal of Business Logistics* 34(2):109-116.

Grawe, S. J., Daugherty, P. J., and Roath, A. S. 2011. "Knowledge Synthesis and Innovative Logistics Processes: Enhancing Operational Flexibility and Performance." *Journal of Business Logistics* 32(1):69-80.

Grover, V., and Malhotra, M. K. 2003. "Transaction Cost Framework in Operations and Supply Chain Management Research: Theory and Measurement." *Journal of Operations Management* 21(4):457-473.

www.manaraa.com

Gulati, R. 1995. "Does Familiarity Breed Trust? The Implications of Repeated Ties for Contractual Choice in Alliances." *The Academy of Management Journal* 38(1):85-112.

Hair, J. F. J., Black, B., Babin, B., Anderson, R. E., and Tatham, R. L. 2006. *Multivariate Data Analysis*. New York: MacMillan Publishing Co. .

Harman, H. H. 1976. *Modern Factor Analysis*. Chicago: The University of Chicago Press.

Hatcher, L. 1994. *A Step-by-Step Approach to Using SAS for Factor Analysis and Structural Equation Modeling*. Cary, NC: SAS Publishing.

Heide, J. B., and John, G. 1990. "Alliances in Industrial Purchasing: The Determinants of Joint Action in Buyer-Supplier Relationships." *Journal of Marketing Research* 27(1):24-36.

Heide, J. B., Wathne, K. H., and Rokkan, A. I. 2007. "Interfirm Monitoring, Social Contracts, and Relationship Outcomes." *Journal of Marketing Research* 44(3):425-433.

Iacobucci, D. 2010. "Structural Equations Modeling: Fit Indices, Sample Size, and Advanced Topics." *Journal of Consumer Psychology* 20(1):90-98.

Jap, S. D. 1999. "Pie-Expansion Efforts: Collaboration Processes in Buyer-Supplier Relationships." *Journal of Marketing Research* 36(4):461-475.

Jap, S. D., and Anderson, E. 2003. "Safeguarding Interorganizational Performance and Continuity under Ex Post Opportunism." *Management Science* 49(12):1684-1701.

Jaworski, B. J., and Kohli, A. K. 1993. "Market Orientation: Antecedents and Consequences." *Journal of Marketing* 57(3):53-70.

John, G., and Weitz, B. A. 1988. "Forward Integration into Distribution: An Empirical Test of Transaction Cost Analysis." *Journal of Law, Economics, and Organization* 4(2):337-355.

Kauffman, R. G., and Popkowski Leszczyc, P. T. 2005. "An Optimization Approach to Business Buyer Choice Sets: How Many Suppliers Should be Included?" *Industrial Marketing Management* 34(1):3-12.

Koberg, C. S. 1987. "Resource Scarcity, Environmental Uncertainty, and Adaptive Organizational Behavior." *The Academy of Management Journal* 30(4):798-807.

Kohli, A. K., and Jaworski, B. J. 1990. "Market Orientation: The Construct, Research Propositions, and Managerial Implications." *Journal of Marketing* 54(2):1-18.

Kwon, I.-W. G., and Suh, T. 2004. "Factors Affecting the Level of Trust and Commitment in Supply Chain Relationships." *Journal of Supply Chain Management* 40(2):4-14.

www.manaraa.com

Lee, H. L. 2002. "Aligning Supply Chain Strategies with Product Uncertainties." *California Management Review* 44(3):105-119.

Lindell, M. K., and Whitney, D. J. 2001. "Accounting for Common Method Variance in Cross-sectional Research Designs." *Journal of Applied Psychology* 86(1):114-121.

Mahapatra, S., Das, A., and Narasimhan, R. 2012. "A Contingent Theory of Supplier Management Initiatives: Effects of Competitive Intensity and Product Life Cycle." *Journal of Operations Management* 30(5):406-422.

Mason-Jones, R., and Towill, D. R. 1997. "Information Enrichment: Designing the Supply Chain for Competitive Advantage." *Supply Chain Management: An International Journal* 2(4):137-148.

Mentzer, J. T., Min, S., and Zacharia, Z. G. 2000. "The Nature of Interfirm Partnering in Supply Chain Management." *Journal of Retailing* 76(4):549-568.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., and Zacharia, Z. G. 2001. "Defining Supply Chain Management." *Journal of Business Logistics* 22(2):1-25.

Miller, D. 1987. "The Structural and Environmental Correlates of Business Strategy." *Strategic Management Journal* 8(1):55-76.

Milliken, F. J. 1987. "Three Types of Perceived Uncertainty about the Environment: State, Effect, and Response Uncertainty." *The Academy of Management Review* 12(1):133-143.

Nunnally, J. C., and Bernstein, I. H. 1994. *Psychometric Theory*. 3rd ed. New York: McGraw-Hill.

Nyaga, G. N., Whipple, J. M., and Lynch, D. F. 2010. "Examining Supply Chain Relationships: Do Buyer and Supplier Perspectives on Collaborative Relationships Differ?" *Journal of Operations Management* 28(2):101-114.

Paulraj, A., and Chen, I. J. 2007. "Environmental Uncertainty and Strategic Supply Management: A Resource Dependence Perspective and Performance Implications." *Journal of Supply Chain Management* 43(3):29-42.

Petersen, K. J., Handfield, R. B., and Ragatz, G. L. 2005. "Supplier Integration into New Product Development: Coordinating Product, Process and Supply Chain Design." *Journal of Operations Management* 23(3–4):371-388.

Podsakoff, P. M., and Organ, D. W. 1986. "Self-Reports in Organizational Research: Problems and Prospects." *Journal of Management* 12(4):531-544.

www.manaraa.com

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., and Podsakoff, N. P. 2003. "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies." *Journal of Applied Psychology* 88(5):879-903.

Podsakoff, P. M., MacKenzie, S. B., and Podsakoff, N. P. 2012. "Sources of Method Bias in Social Science Research and Recommendations on How to Control It." *Annual Review of Psychology* 63(1):539-569.

Porter, M. E. 1980. *Competitive Strategy*. New York: Free Press.

Ragatz, G. L., Handfield, R. B., and Petersen, K. J. 2002. "Benefits Associated with Supplier Integration into New Product Development Under Conditions of Technology Uncertainty." *Journal of Business Research* 55(5):389-400.

Ralston, P., Grawe, S., and Daugherty, P. 2013. "Logistics Salience's Impact on Logistics Capabilities and Performance." *International Journal of Logistics Management* 24(2):136-152.

Richey, R. G., Roath, A. S., Whipple, J. M., and Fawcett, S. E. 2010. "Exploring a Governance Theory of Supply Chain Management: Barriers and Facilitators to Integration." *Journal of Business Logistics* 31(1):237-256.

Richey, R. G., Adams, F. G., and Dalela, V. 2012. "Technology and Flexibility: Enablers of Collaboration and Time-Based Logistics Quality." *Journal of Business Logistics* 33(1):34-49.

Rindfleisch, A., and Heide, J. B. 1997. "Transaction Cost Analysis: Past, Present, and Future Applications." *Journal of Marketing* 61(4):30-54.

Sabath, R. E., and Fontanella, J. 2002. "The Unfulfilled Promise of Supply Chain Collaboration." *Supply Chain Management Review* 6(4):24-29.

Sanders, N. R., and Premus, R. 2005. "Modeling the Relationship Between Firm IT Capability, Collaboration, and Performance." *Journal of Business Logistics* 26(1):1-23.

Sanders, N. R., Autry, C. W., and Gilgor, D. M. 2011. "The Impact of Buyer Firm Information Connectivity Enablers on Supplier Firm Performance: A Relational View." *International Journal of Logistics Management* 22(2):179-201.

Sher, P. J., and Yang, P. Y. 2005. "The Effects of Innovative Capabilities and R&D Clustering on Firm Performance: The Evidence of Taiwan's Semiconductor Industry." *Technovation* 25(1):33-43.

Skjoett-Larsen, T., Thernøe, C., and Andresen, C. 2003. "Supply Chain Collaboration: Theoretical Perspectives and Empirical Evidence." *International journal of physical distribution & logistics management* 33(6):531-549.

www.manaraa.com

Spekman, R. E. 1988. "Strategic Supplier Selection: Understanding Long-Term Buyer Relationships." *Business horizons* 31(4):75-81.

Srinivasan, M., Mukherjee, D., and Gaur, A. S. 2011. "Buyer–Supplier Partnership Quality and Supply Chain Performance: Moderating Role of Risks and Environmental Uncertainty." *European Management Journal* 29(4):260-271.

Srinivasan, R., and Brush, T. H. 2006. "Supplier Performance in Vertical Alliances: The Effects of Self-Enforcing Agreements and Enforceable Contracts." *Organization Science* 17(4):436-452.

Stank, T. P., Keller, S. B., and Closs, D. J. 2001. "Performance Benefits of Supply Chain Logistical Integration." *Transportation Journal* 41(2/3):32-46.

Sutcliffe, K. M., and Zaheer, A. 1998. "Uncertainty in the Transaction Environment: An Empirical Test." *Strategic Management Journal* 19(1):1-23.

Tadelis, S., and Williamson, O. E. 2012. Transaction Cost Economics. In *The Handbook of Organizational Economics*, edited by R. Gibbons and J. Roberts. 2013: Princeton University Press.

Thompson, J. D. 1967. *Organization's in Action*. New York: McGraw Hill.

Vickery, S. K., Jayaram, J., Droge, C., and Calantone, R. 2003. "The Effects of an Integrative Supply Chain Strategy on Customer Service and Financial Performance: An Analysis of Direct Versus Indirect Relationships." *Journal of Operations Management* 21(5):523-539.

Weiss, A. M., and Anderson, E. 1992. "Converting From Independent to Employee Salesforces: The Role of Perceived Switching Costs." *Journal of Marketing Research (JMR)* 29(1):101-115.

Weitz, B. A., and Jap, S. D. 1995. "Relationship Marketing and Distribution Channels." *Journal of the Academy of Marketing Science* 23(4):305-320.

Whipple, J. M., Lynch, D. F., and Nyaga, G. N. 2010. "A Buyer's Perspective on Collaborative Versus Transactional Relationships." *Industrial Marketing Management* 39(3):507-518.

Williamson, O. E. 1973. "Markets and Hierarchies: Some Elementary Considerations." *The American Economic Review* 63(2):316-325.

———. 1979. "Transaction-Cost Economics: The Governance of Contractual Relations." *Journal of Law and Economics* 22(2):233-261.

Williamson, O. E. 1985. *The Economic Intstitutions of Capitalism*. New York: Free Press.

www.manaraa.com

Williamson, O. E. 1991. "Comparative Economic Organization: The Analysis of Discrete Structural Alternatives." *Administrative Science Quarterly* 36(2):269-296.

———. 2008. "Outsourcing: Transaction Cost Economics and Supply Chain Management." *Journal of Supply Chain Management* 44(2):5-16.

Wong, C. Y., Boon-itt, S., and Wong, C. W. Y. 2011. "The Contingency Effects of Environmental Uncertainty on the Relationship Between Supply Chain Integration and Operational Performance." *Journal of Operations Management* 29(6):604-615.

Zacharia, Z. G., Nix, N. W., and Lusch, R. F. 2009. "An Analysis of Supply Chain Collaborations and their Effect on Performance Outcomes." *Journal of Business Logistics* 30(2):101-124.

———. 2011. "Capabilities That Enhance Outcomes of an Episodic Supply Chain Collaboration." *Journal of Operations Management* 29(6):591-603.

www.manaraa.com

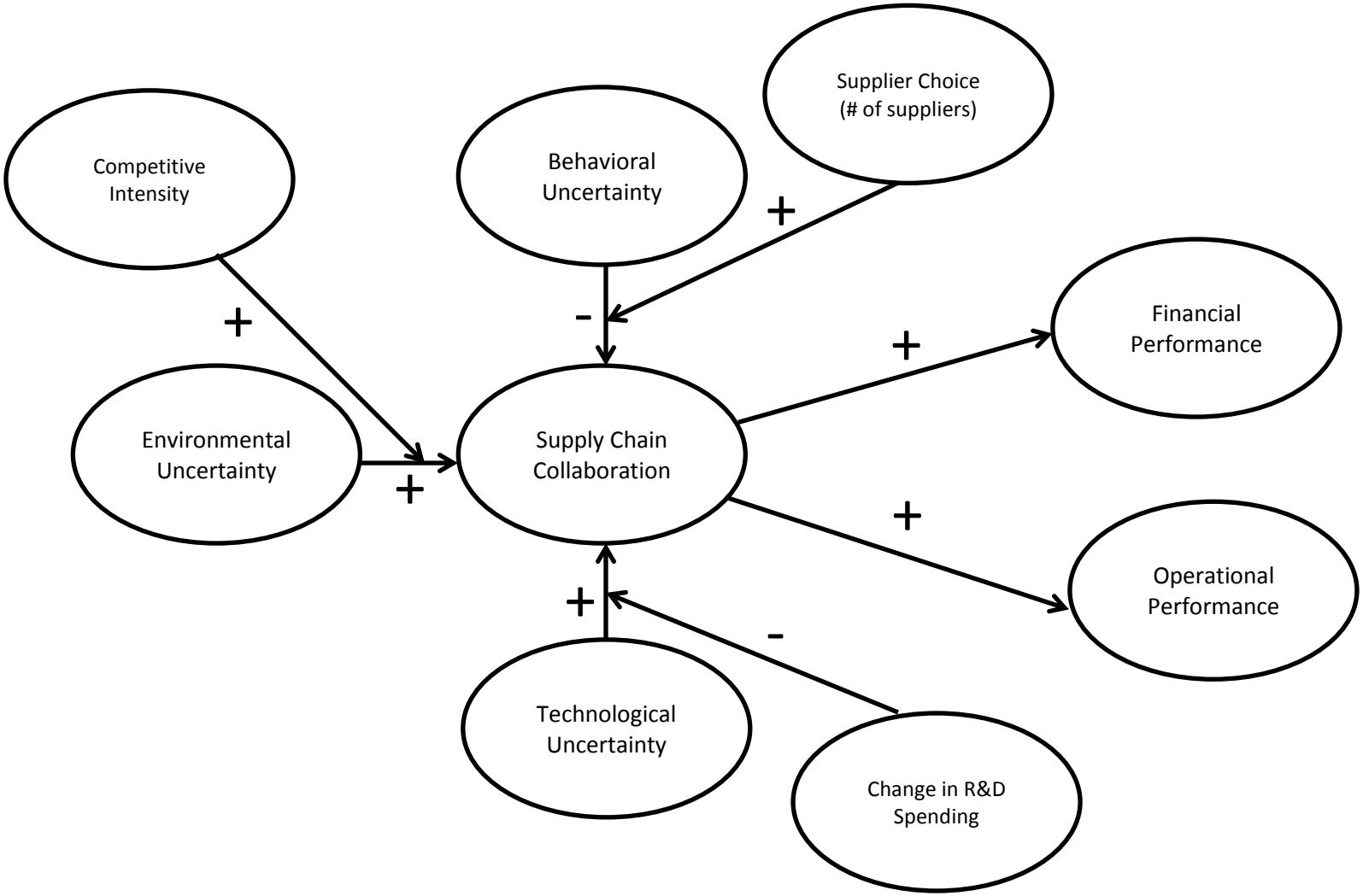

Figure 1: Theoretical model: Uncertainty and supply chain collaboration

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Table 5: Chapter 3: Factor loadings and Cronbach Alpha

Constructs	Average variance extracted	Cronbach's Alpha	Range of Factor Loadings
Behavioral Uncertainty	0.56	0.79	.73 to .78
Environmental Uncertainty	0.46	0.71	.63 to .71
Technological Uncertainty	0.61	0.79	.74 to .80
Supply Chain Collaboration	0.50	0.83	.58 to .70
Competitive Intensity	0.51	0.75	.64 to .76
Financial Performance	0.75	0.95	.83 to .89
Operational Performance	0.58	0.87	.67 to .82
# of Suppliers		N/A	Single Item
R&D		N/A	Single Item

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Table 6: Chapter 3: AVE correlations

	BU	EU	TU	SCC	CI	FP	OP
BU	**0.75**						
EU	0.56	**0.68**					
TU	0.09	0.18	**0.78**				
SCC	0.06	0.17	0.53	**0.71**			
CI	0.14	0.30	0.69	0.46	**0.71**		
FP	0.03	0.12	0.51	0.63	0.30	**0.87**	
OP	-0.06	0.02	0.54	0.62	0.40	0.85	**0.76**

BU = Behavioral Uncertainty, EU = Environmental Uncertainty, TU = Technological Uncertainty, SCC = Supply Chain Collaboration, CI = Competitive Intensity, FP = Financial Performance, OP = Operational Performance
Bold values represent the square root of the construct's AVE

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Table 7: Chapter 3: Model results

Direct		
	CFA	SEM
X2/DF	1.9	1.94
CFI	0.93	0.93
TLI	0.924	0.921
AIC	623.707	682.826
RMSEA	0.06	0.062
	BU->SCC	-0.056
	EU->SCC	0.093
	TU->SCC	.566***
	SCC->FP	.656***
	SCC->OP	.646***
	R2	
	SCC	0.339
	FP	0.43
	OP	0.418

Model 1:	Behavioral Uncertainty	
	SEMw/SUP	SEMw/MOD
X2/DF	1.929	1.811
CFI	0.926	0.926
TLI	0.916	0.91
AIC	733.482	859.942
RMSEA	0.062	0.058
Paths		
BU->SCC	-0.071	-0.112
SUP->SCC	0.153*	0.08
BUxSUP	N/A	.554***
EU->SCC	0.058	.287***
TU->SCC	.554***	.119 (p<.10)
SCC->FP	0.657***	0.67
SCC->OP	.642***	0.658
R2		
SCC	0.36	0.422
FP	0.432	0.449
OP	0.413	0.433

Model 2	Competitive Intensity	
	SEMw/CI	SEMw/MOD
X2/DF	1.928	1.865
CFI	0.919	0.908
TLI	0.909	0.89
AIC	843.642	997.757
RMSEA	0.062	0.06
Paths		
BU->SCC	-0.054	-0.075
EU->SCC	0.07	0.043
CI->SCC	0.124	0.176
EUxCI	N/A	0.247*
TU->SCC	0.487***	0.404***
SCC->FP	0.653***	0.648***
SCC->OP	0.647***	0.645***
R2		
SCC	0.349	0.405
FP	0.426	0.42
OP	0.419	0.416

Model 3:	Technological Uncertainty	
	SEMw/RD	SEMw/MOD
X2/DF	1.906	1.76
CFI	0.927	0.928
TLI	0.918	0.913
AIC	727.131	841.631
RMSEA	0.061	0.056
Paths		
BU->SCC	-0.091	-0.07
EU->SCC	0.08	0.139*
TU->SCC	.523***	0.28***
RD->SCC	.270***	0.031
TUxRD	N/A	.121 (p<.10)
SCC->FP	.669***	0.666***
SCC->OP	.657***	0.651***
R2		
SCC	0.41	0.439
FP	0.447	0.444
OP	0.432	0.424

*** p<.001, ** p<.01, * p<.05

BU = Behavioral Uncertainty, EU = Environmental Uncertainty, TU = Technological Uncertainty, SCC = Supply Chain Collaboration, CI = Competitive Intensity, SUP = # of Suppliers, RD = Research & Development

SEMw/MOD refers to the model run with moderation

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CHAPTER 4: ASSESSING THE SUPPLY CHAIN COLLABORATION – COLLABORATIVE BENEFITS RELATIONSHIP: PERFORMANCE IMPLICATIONS AND MODERATING EFFECTS

A paper to be submitted to the *Journal of Supply Chain Management*

Peter Ralston

4.1 Abstract

While supply chain collaboration has been shown to have a positive, direct effect on firm performance in past research, not every firm experiences successful collaboration. Reasons for this disappointment include unmet expectations, misaligned expectations between partners, incongruent purposes for collaboration, and high costs. The intent of this paper is to research a mediating factor on the supply chain collaboration / performance relationship, namely collaborative benefits. Collaborative benefits are conceptualized as firm level benefits of partners in a supply chain collaboration that can be used outside of the specific collaboration from which they were derived. Essentially, they are potentially spill-over effects from supply chain collaboration that can still positively impact performance. This paper confirms the mediating effect of collaborative benefits between supply chain collaboration and firm performance. Additionally, a series of mediators are presented which may strengthen the relationship between supply chain collaboration and collaborative benefits.

4.2 Introduction

The challenges of the competitive marketplace often require firms to look outside their organization for assistance in meeting the expectations and requirements of customers.

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Stemming from an increased internal emphasis on core firm competencies, companies search externally for firms with specialized capabilities or resources to complement, supplement, and sustain operations. Firms come together in such a way to effectively create and manage an entire product or service supply chain (Zacharia et al., 2011). Supply chain management is the coordination of the chain of events between supply chain members associated with the movement of goods and services from raw materials to the end consumer (Mentzer et al., 2001; Richey et al., 2010). Essentially, supply chain management pairs firms based on access to resources, capabilities, market demand and willingness to collaborate in order to transport and distribute products (Bowersox and Daugherty, 1987; Cooper and Ellram, 1993; Bowersox et al., 1999). However, it has been suggested that supply chains can contribute more to sustaining success by seeing partners actively work together. The partners can create new, joint capabilities by collaborating across the supply chain (Min et al., 2005; Fawcett et al., 2008; Nyaga et al., 2010; Daugherty, 2011; Fawcett et al., 2012).

Supply chain collaboration involves a long-term relationship where participants cooperate, share information, and work together to plan and even modify their business practices to improve joint performance (Whipple et al., 2010). Supply chain collaboration may result in benefits and outcomes unattainable when firms work independently (Corsten and Kumar, 2005). Companies leverage the resources and competencies of partners to better existing or to create new, shared capabilities (Petersen et al., 2005; Fawcett et al., 2008). These enhanced offerings can improve competitive positioning by either strengthening a firm's current standing or generating additional opportunities for firms to pursue (Stank et al., 2001b). The collaborations may lead to enhanced performance through risk sharing, a reduction of transaction costs, and

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process efficiencies and/or improvements (Nyaga et al., 2010; Cao and Zhang, 2011; Fawcett et al., 2012).

However, not every collaborative endeavor delivers the expected value to each participant (Sabath and Fontanella, 2002; Min et al., 2005; Daugherty, 2011). Collaborative failures stem from a number of sources including not meeting expectations, incongruent expectations, incompatible partnerships, high relationship management costs, and conflicting reasons for collaborating between partners (Fawcett and Magnan, 2002; Nyaga et al., 2010; Whipple et al., 2010; Fawcett et al., 2012). These findings indicate firms may need to revise their thoughts on supply chain collaboration and establish more realistic expectations in regards to collaborative relationships.

Accordingly, the current research offers a new perspective when thinking about supply chain collaboration's relationship with firm performance, namely the mediating effects of collaborative benefits. Collaborative benefits are defined as the strategic and operational enhancements gained over competitors in the marketplace generated through supply chain partnering (Lavie, 2006; Cao and Zhang, 2011). Collaborations are a unique interorganizational phenomenon due to a firm's ability to potentially derive value in a number of ways. Collaborations may solve or address the specific issue for which collaboration occurred in the first place, and also collaboration may generate spill-over benefits for which firms find added value (Cousins et al., 2006). These benefits are derived from the unique combination of firms in a collaboration (Lavie, 2006).

The current study investigates the relationship between supply chain collaboration and collaborative benefits and collaborative benefits relationship with both firm financial and

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operational performance. Rethinking collaboration and its potential outcomes responds to the call for more research in the area by Daugherty (2011). Additionally, as a means of investigating ways to strengthen the supply chain collaboration / collaborative benefits relationship (i.e. enhance collaborative success, instead of disappointment), three moderators will be examined: collaborative process competence, goal congruence, and partner interdependence. The use of moderators on the supply chain collaboration / collaborative benefits link helps to establish boundary conditions around the relationship (Goldsby et al., 2013). Understanding the "when" around a relationship provides further insight for researchers and additional means to practitioners to enhance the probability of collaborative success (Frazier et al., 2004).

4.3 Theory

While companies utilize a variety of interactions and relationships with customers and suppliers, one method garnering more attention in the literature is supply chain collaboration (Min et al., 2005; Daugherty et al., 2006; Fawcett et al., 2008; Zacharia et al., 2009; Nyaga et al., 2010; Richey et al., 2010; Whipple et al., 2010; Cao and Zhang, 2011; Chen et al., 2011; Daugherty, 2011; Zacharia et al., 2011; Fawcett et al., 2012; Hartmann and de Grahl, 2012). Collaborative relationships help firms share risks, access complementary capabilities, jointly create new capabilities, and generate potential advantages over competitors (Cao and Zhang, 2011). While supply chain collaboration is a multi-firm phenomenon, the decision to enter into a collaborative arrangement still requires firm level consent (Ellram et al., 2008). Thinking of this perspective, the current research finds its theoretical foundations in both transaction cost economics (TCE) and the relational view of interorganizational exchange.

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TCE is a theoretical framework often associated with a firm's decision to make a good, component, or service internally versus buying that good, component, or service externally in the open-market (Williamson, 1973). Further research identifies a transaction governance continuum for which market exchanges and vertical integration represent two ends of the governance spectrum (Williamson, 1985; Williamson, 1991). This conceptualization allows for the presence of a hybrid governance mechanism which allows for long-term relationships between distinct firms. The hybrid mechanism reduces transaction costs with actively seeking exchange partners and "shopping" business while also reducing the ownership costs of vertical integration (Rindfleisch and Heide, 1997; Nyaga et al., 2010). While monitoring costs and opportunism of partners can still exist, collaboration helps firms reduce transaction costs through process integration and relational factors while also avoiding internalizing an activity outside a firm's core competencies (Cao and Zhang, 2011). These factors are important to understanding collaboration is still an economic decision. Firms collaborate because of the potential reduction in costs over another economic alternative. This is due to the knowledge or capabilities accessed, resource certainty created by the relationship, and potential operational efficiencies generated (Fawcett et al., 2008). With the understanding that supply chain collaboration can lower costs and positively impact firm performance, the choice to collaborate can be an attractive option for firms to pursue. However, as with many strategic choices, once the decision to collaborate occurs; firms need to aid and support the collaboration in order to have the possibility for the endeavor to succeed and benefits generated (Swink et al., 2007). One such supportive method is to cultivate or maintain an established relationship with supply chain partners.

Dyer and Singh (1998) discussed the relational view of inter-organizational exchange and noted firms ability to generate relational rents, or collaborative benefits, in inter-organizational

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relationships through the idiosyncratic contributions of partners. The collaborative advantage derived from supply chain collaborations allows partners to appreciate the opportunities afforded by working together instead of the destructive forces of working individually against the purpose of the collaboration (Cao and Zhang, 2011). Pursuing a strategy of myopic self-interest when intertwined with supply chain partners at a more intimate level can cause severe strain on the relationships between collaborators (Fawcett et al., 2006). Additionally, the intent of the supply chain collaboration may be compromised when firms place their interests over and above that of the supply chain (Vickery et al., 2003). This may highlight the potential challenge of a direct relationship between supply chain collaboration and firm performance in all collaborative settings. Firm performance may be a possible, but not necessarily assured, outcome of supply chain collaboration (Stank et al., 2001b; Cao and Zhang, 2011). Rather firms should commit to the original goals and intentions of collaborative endeavors (Fawcett et al., 2006). This serves multiple purposes. Number one, the collaboration may be more successful (Zacharia et al., 2011; Richey et al., 2012). Number two, performance may be positively impacted. Number three access to other resources or capabilities which may individually be beneficial to firms can occur, or in other words, collaborative benefits potentially exist.

4.4 Literature Review and Hypotheses Development

One potential challenge to supply chain collaboration is the inherent requirement for multiple organizations to participate in the supply chain, but the desire of companies to derive additional, firm-level benefits from the partnership. Supply chain collaboration is typically an inter-organizational phenomenon (Stank et al., 2001b; Nyaga et al., 2010; Grawe et al., 2011; Hartmann and De Grahl, 2011, 2012). As such, immediate collaborative outcomes should be at the supply chain level. However, firms may see supply chain collaboration as an important

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component of the strategic direction of the firm (Vickery et al., 2003; Swink et al., 2007). As companies place more emphasis behind collaboration, it is only appropriate for them to want to extract firm-level benefits as well (Jap, 1999).

Dyer and Singh (1998) suggested a firm's critical resources may be embedded or enhanced by interfirm routines and processes. Collaborations are a unique interorganizational phenomenon due to a firm's ability to potentially derive value in a number of ways. Collaborations may solve or address the specific issue for which collaboration occurred in the first place, and also collaboration may generate spill-over benefits for which firms find added value (Cousins et al., 2006). It is these benefits which is one primary interest of the current study.

Collaborative benefits are defined as the strategic and operational enhancements gained over competitors in the marketplace generated through supply chain partnering (Lavie, 2006; Cao and Zhang, 2011), but experienced and utilized at the firm level. Collaborative benefits may include cost savings, efficiencies, integrated production and marketing systems, and improved quality (Daugherty et al., 2006; Nyaga et al., 2010; Cao and Zhang, 2011). These benefits are the result of the collaboration, but not necessarily its sole purpose. If this is the case, the collaborative benefits serve as an added pay out of collaboration (Jap, 1999).

As firms collaborate, one benefit may be process efficiencies (Lee, 2004). Process efficiencies are defined as firms' collaborative processes cost competitiveness versus expectations (Bagchi et al., 2005; Cao and Zhang, 2011). Collaborative relationships can be judged on performance and the practices which lead to higher firm performance (Simatupang and Sridharan, 2005). Meeting or beating unit cost estimates or overall productivity standards

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which can be attributed to collaboration is one way to impact performance. As process efficiency is a measure of success and a determinant factor of the ability of the firm to profit, achieving these efficiencies are not only desirable to a collaboration, but also specific firms within the collaboration (Cao and Zhang, 2011).

Offering flexibility refers to the extent to which a firm's supply chain linkage supports changes in product or service offerings (Cao and Zhang, 2011). Collaborating firms may often need to change process structures or adapt to unforeseen changes in the marketplace (Gosain et al., 2004). This flexibility allows firms and collaborations to remain responsive in a dynamic environment. One specific form of flexibility is being able to adapt to varying customer needs. Collaborations can lead firms to have a coordinated response, whether intentional or unintentional, to client needs (Handfield and Bechtel, 2002). If firms focus on meeting customer needs, competitive advantages and profits can result (Fawcett et al., 2012).

Another factor which may be impacted by collaboration is quality. Quality refers to the extent which a firm offers good or services in excellent condition and capability based on a supply chain relationship (Li et al., 2005). Quality is a desirable trait at the collaboration and firm level (Cao and Zhang, 2011).

Business synergy is defined as the realization of supernormal benefits after combining partner complementary and related resources (Cao and Zhang, 2011). Synergy between collaborators can return benefits greater than the sum of the individual parties (Ansoff and McDonnell, 1988). While partnerships can create benefits over what is possible as individual firms, the realization of the synergy and how this synergy gets capitalized on may be the true positive impact of collaboration. Synergy occurs after two or more different parties come

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together, but how it is utilized can be the decision of one of the collaborating entities (Larsson and Finkelstein, 1999).

Process efficiencies, offering flexibility, quality and business synergy are collaborative benefits which are investigated in this paper. These benefits represent strategic and operational enhancements achieved through collaboration which can also be utilized at the firm level (Lavie, 2006; Cao and Zhang, 2011). Supply chain collaboration may be one way for firms to address specific problems or issues they face (Williamson, 2008). However, firms may seek to apply the effects of collaboration into other areas of business. As such, firms may see collaborations as a way to expand their ability to compete, especially after addressing the issue for collaboration initiation (Jap, 1999). Therefore, collaborative benefits may be a desired outcome of supply chain collaboration, even if immediate results from these benefits are not expected. Thus, the following hypothesis is offered:

H1: Supply chain collaboration is positively related to collaborative benefits

Firm performance refers to how well a firm fulfills its financial and operational goals versus competitors while also maintaining the ability to charge a premium for products or services offered (Cao and Zhang, 2011; Richey et al., 2012). This study uses financial performance metrics such as sales, sales growth, return on sales and others to gauge a firm's financial ability to generate revenues and profits. This conceptualization matches other recent notions of firm financial performance (Zhao et al., 2008; Flynn et al., 2010; Cao and Zhang, 2011; Zhao et al., 2011). Considering operational performance should occur when researching supply chain issues because of the inherent operational aspect of the phenomenon (Richey et al.,

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2012). Operational impact on on-time delivery, quality, defects, and operational performance were investigated (Ellram et al., 2008; Zacharia et al., 2011; Grawe et al., 2012).

Collaborative benefits may provide firms advantages over and above those delivered solely by collaboration. Min et al. (2005) noted through a survey and series of interviews that practitioners were sometimes put off by collaboration's inability to generate immediate financial performance gains. This proved especially challenging for firms when entering future collaborations. While reaping financial benefits from collaboration is desirable, understanding that developing benefits from collaborations may occur instead. These benefits would then be what drives firm performance, both financially and operationally (Min et al., 2005). This perspective is supported by both the relational view and TCE. The relational view states that performance benefits may be derived from the interorganizational capabilities and processes shared between collaborators (Barney, 1991; Dyer and Singh, 1998). TCE points to the market cost reduction and performance benefits generated between relationships which share idiosyncratic assets and frequent transactions (Williamson, 1985; Williamson, 1991; Ellram et al., 2008). With that stated, the following hypotheses are offered:

H2: Collaborative benefits are positively related to firm financial performance

H3: Collaborative benefits are positively related to firm operational performance

Firms may be able to exploit unique knowledge and skills because of, or derived from, supply chain collaborations (Stank et al., 2001b; Rosenzweig et al., 2003; Vickery et al., 2003; Fawcett et al., 2008). However, developing this capability may require effective management skills which aid in ensuring the smooth operation of a collaboration (Priem and Swink, 2012).

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This competence, a collaborative process competence, may serve as a key capability to provide operational and competitive advantages (Mishra and Shah, 2009; Cao and Zhang, 2011).

Collaborative process competence is defined as a firm's ability to select appropriate collaborative partners, establish processes to monitor and manage collaborative initiatives, and resolve conflicts which arise between firms in collaboration (Zacharia et al., 2011). Lambe et al. (2002) noted that collaborative process competence is a skill built through experience. Initial collaborative arrangements may be more susceptible to failure due to partners not fully understanding what is required to make collaboration a success. In this regards, collaborative process competence, learned over time and through previous collaborative experiences, may impact the success of collaborations. Collaborative process competence is a managerial tool to influence the effectiveness and efficiency of collaboration (Schoenherr and Swink, 2012). With the ability to effect the outcomes of collaboration (Zacharia et al., 2011), the specific relationship between supply chain collaboration and collaborative benefits may be impacted by collaborative process competence. Thus, the following hypothesis is offered:

H4: Collaborative process competence positively moderates the relationship between supply chain collaboration and collaborative benefits

Goal congruence is a firm's perception that firm objectives are satisfied by meeting the collaboration's objectives (Cao and Zhang, 2011). This implies synchronization exists between firm and supply chain goals. Additionally, if supply chain goals are agreed upon by members of the supply chain, there is some communality of goals across firms within the supply chain (Skjoett-Larsen et al., 2003). True goal congruence signifies supply chain collaborators feel individual firm objectives coincide with those of the supply chain, or, if there is some goal

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disparity, firm goals will be better achieved as a direct result of working towards the goals of the supply chain (Lejeune and Yakova, 2005; Cao et al., 2010).

Shared goals should lead to collaborative success (Daugherty, 2011). Mentzer et al. (2000) noted that collaborations committed to achieving strategic goals can deliver value to customers and profitability to partners. Congruent goals may provide an added focus for collaborations. Parties which agree on the goals of a collaboration may experience enhanced collaborative performance or benefits (Jap and Anderson, 2003). Therefore the relationship between supply chain collaboration and collaborative benefits may also be impacted by goal congruence. The following hypothesis is presented:

H5: Goal congruence positively moderates the relationship between supply chain collaboration and collaborative benefits

Partner interdependence refers to firms bilateral needs to maintain a relationship with one another in order to achieve individual firm goals (Frazier, 1983; Kumar et al., 1995). Interdependence in collaborative relationships is thought to improve collaborative success and performance (Mentzer et al., 2000). Firms realize they need each other to make collaborations work, or even survive in the competitive marketplace. Interdependence refers to more than just accessing and utilizing partner capabilities; rather organizations make joint decisions or look for synergistic capabilities impossible to generate alone (Zacharia et al., 2011). When firms realize they need each other to be successful, operations can be enhanced and specific outcomes achieved (Nauta and Sanders, 2001). Thus, the following hypothesis is offered:

H6: Partner interdependence positively moderates the relationship between supply chain collaboration and collaborative benefits.

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4.5 Research Methodology

4.5.1 Data Collection

Guidelines recommended by Dillman (2000) were utilized for survey design and data collection in the current research. Multi-item reflective measures were adapted from previous research to evaluate the selected constructs (Churchill Jr., 1979). A preliminary draft of the survey was reviewed by 8 supply chain management educators and 4 supply chain executives for the purposes of evaluating the measures and survey for representativeness, clarity, content validity, and face validity. After receiving the experts' feedback, refinements were made to improve the overall quality of the questionnaire. The items, means, standard deviations, Cronbach Alpha's, and scale source(s) are located in the appendix.

Data for the current study were collected by accessing panel respondents via SurveyMonkey. Potential survey respondents are broadly classified into various groups by SurveyMonkey after answering a number of demographic, occupational, and geographical questions. Researchers then have the ability to target specific segments of the panel after further refining selection criteria based on designated profile characteristics. Accessing members from existing online survey panels has become a tool utilized more frequently by academic researchers (Autry et al., 2010; Grawe et al., 2011; Ralston et al., 2013). Potential respondents for this project consisted of decision makers from U.S. firms that regularly interacted with suppliers or supply chain partners to provide goods or services to consumers. Screening questions were utilized at the beginning of the survey to ensure respondents matched the scope of the research project. Participants who either did not select, or provided job categories outside the intent of the survey, were not allowed to complete the questionnaire. Additionally, two

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questions served as filtering screens at the end of the survey. The first was "the questions in this survey are relevant to my firm" and the second was "I had enough information to answer all of the questions in the survey", (1 = strongly disagree, 4 = neutral, and 7 = strongly agree). Responses of 4 or lower from either of the questions saw the entire response set from the completed questionnaire being dropped from the analysis. After initially receiving 432 surveys, further analysis based on the screening questions and missing data resulted in a usable sample of 237 surveys.

Non-response bias was assessed by comparing the responses of early versus late respondents. Armstrong and Overton (1977) noted some potential similarities between late responders to surveys and non-respondents. In this case, late respondents act as a proxy to represent non-respondents. No statistically significant differences were found between the early and late respondent group. Therefore, non-response bias is not viewed as a serious concern in our sample.

Common methods bias (CMB) is considered a threat to the validity of findings from survey research and can occur when using a single firm respondent to a given survey at one point in time (Podsakoff and Organ, 1986; Podsakoff et al., 2003). However, a number of approaches were utilized to assess and potentially limit its effects on survey results. First Likert scale ranges amongst the latent variables within our questionnaire varied from 5 to 7 points. This has been identified as one way to limit CMB as variation in scale measures serves as one method to interrupt repetitive habits of respondents (Podsakoff et al., 2012). A Harman's single factor test was also completed to assess CMB within the study (Harman, 1976). If all measurement items across the latent variables in the study were to load on one exploratory factor, or one factor accounted for more than 50% of the explained variance, CMB would be assumed to impact the

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current study's results. An exploratory factor analysis amongst the items was performed returning eight factors above the eigenvalue greater than 1.0 criterion. The factors explained 67% of the variance within the study, with the largest factor accounting for only 38% of the variance. A final test to assess the impact of CMB was performed using Lindell and Whitney's (2001) marker variable technique. In this analysis, CMB is assumed to be represented by the smallest correlation between an a priori, theoretically unrelated marker variable (in this case, a variable assessing self-confidence) and a latent construct within the model. This marker variable correlation was then partialled out from the constructs of interests to see if the remaining relationship between constructs was still significant without the presence of the method bias. The remaining correlations remained significant, indicating CMB did not play a serious role in the relationship between constructs in our study. Based on the prior analyses, we believe CMB is not a severe threat within our sample.

4.5.2 Measurement Item Development

Five-point and seven-point Likert scales were used for all scale items. Additionally, the items used in the current study have been adapted from previous scales. Supply chain collaboration items were drawn from Stank et al. (2001b) primarily due to the operational nature of the items identified by the authors. Respondents were asked to indicate their level of agreement in regards to specific collaborational elements between their firm and supply chain partner. Five measurement items were used with responses ranging from 4.88 to 5.25 (1 = Strongly Disagree, 4 = Neutral, and 7 = Strongly Agree), indicating moderate levels of supply chain collaboration.

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Collaborative benefits items were adapted from Cao and Zhang (2011), Gosain et al. (2004), and Larsson and Finkelstein (1999). Respondents were asked to indicate their level of agreement in regards to benefits derived from collaboration between their firm and supply chain partner. Responses across seven measurement items ranged from 3.54 to 4.03 (1 = Strongly Disagree, 3 = Neutral, and 5 = Strongly Agree), indicating moderate to slightly higher levels of collaborative benefits.

Three different moderators were utilized to further assess the relationship between supply chain collaboration and collaborative benefits. Collaborative process competence served as one moderator on the interaction between collaboration and collaborative benefits. Respondents were asked to indicate their level of agreement with statements related to their firm's ability to select collaborative partners and means to aid in ensuring collaborative success. Responses across five measurement items, adapted from Spekman et al. (1997) and Zacharia et al. (2011), ranged from 5.37 to 5.72 (1 = Strongly Disagree, 4 = Neutral, and 7 = Strongly Agree). These means indicate slightly higher levels of collaborative process competence. Goal congruence between partners was also used to moderate the relationship between supply chain collaboration and collaborative benefits. Four measurement items drawn from Cao and Zhang (2011) were used to measure the construct. Respondents were asked to indicate their level of agreement with statements regarding the level of agreement between collaborators towards the goals or outcomes of the collaboration. Responses ranged from 5.45 to 5.51 (1 = Strongly Disagree, 4 = Neutral, and 7 = Strongly Agree) indicating slightly higher levels of goal congruence between firms. Partner interdependence was also used as a moderator to the supply chain collaboration / collaborative benefits relationship. Four measurement items drawn from Jap (1999) and Zacharia et al. (2011) were used to assess the construct. Respondents were asked to indicate

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their level of agreement with statements regarding how their firm and supply chain partner relied on one another. Responses ranged from 5.09 to 5.34 (1 = Strongly Disagree, 4 = Neutral, and 7 = Strongly Agree) indicating slightly higher levels of partner interdependence between firms.

Both financial and operational measures were gathered using a seven point Likert scale (1 = much worse, 4 = neutral, and 7 = much better). Financial performance was measured using six items adapted from Flynn et al. (2010). Respondents were asked to judge their firm's performance against stated objectives of the firm on sales and financial metrics. Operational performance items were drawn from Grawe et al. (2011). Similarly to financial performance, respondents were asked to grade their firm's performance against stated firm objectives for a number of operational characteristics.

Years of experience and firm sales were utilized as control variables within the current study. Full-time work experience was employed as a control variable to ensure those employees with higher levels of full-time experience were not significantly impacting the results. Firm sales figures were used as a proxy for firm size and utilized to control for differences in sizes between firms. Neither of the control variables significantly impacted the study's results.

4.5.3 Analysis

The researchers utilized the two-step modal analysis approach developed by Anderson and Gerbing (1988). Confirmatory factor analysis (CFA) was used to evaluate the measurement items. After determining the data sufficiently fit the conceptual model and the items were both valid and reliable, structural equation modeling was used to analyze the hypothesized relationships between constructs. The statistical analyses were completed in SPSS and Amos Version 19.

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4.5.4 Measurement Model

Convergent validity of the constructs was assessed by reviewing the standardized factor loadings of the measurement items of each construct. Factor loadings ranged from .59 to .89. With loadings above .50, convergent validity within each construct is supported (Hair et al., 2006). A chi-square difference test was run to assess the discriminant validity between constructs in the analysis. In this test, each pair of constructs' correlation was set to one in a series (only one correlation set to one at a time) and compared to the original X^2 and D.F. values of the measurement model. If the difference in X^2 is significant, we can assume that the constructs are distinct (Hatcher, 1994). Each X^2 test was significantly different from the original measurement model indicating it is appropriate to consider the constructs in the model distinct from one another. Reliability analyses were completed by assessing the Cronbach's Alpha of each construct (Cronbach, 1951). The lowest reported Cronbach Alpha was .79 for the partner interdependence construct. All Cronbach's Alpha returned were over the .70 threshold indicating the constructs consistently measured what was intended (Nunnally and Bernstein, 1994).

The data sufficiently fit the measurement model (X^2/D.F. = 2.03, CFI = .90, RMSEA = .065). Each measurement index falls within acceptable ranges and indicate adequate model fit (Iacobucci, 2010). These findings, along with the tests for validity and reliability, allow us to proceed to evaluating the proposed structural model in the project.

4.6 RESULTS

Four different structural models were used to analyze the hypotheses presented in the current study. The first structural model contained the direct relationships between supply chain

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collaboration and collaborative benefits along with collaborative benefits' relationship with both financial and operational performance. Additionally, the model contained the moderator constructs without specified interaction effects between the constructs. Separately, three additional structural models were tested with each containing one of the three previously identified moderators. This step was followed to eliminate the confounding effects of the various moderators and to generate a clear picture of how each specific moderator interacted with the supply chain collaboration / collaborative benefits relationship.

The first structural model with the relationship between supply chain collaboration and collaborative benefits as well as collaborative benefits and both financial and operational performance indicate adequate model fit (X^2/D.F. = 2.19, CFI = .88, RMSEA = .069) (Iacobucci, 2010). Hypothesis one predicted a positive relationship between supply chain collaboration and collaborative benefits. The standardized path coefficient returned was .51 ($p<.001$) indicating supply chain collaboration does have a significant effect on collaborative benefits. Hypothesis 2 and 3 stated that collaborative benefits would positively impact both firm financial and operational performance respectively. Results support these hypotheses with a standardized path coefficient between collaborative benefits and financial performance of .733 ($p<.001$) and a standardized path coefficient between collaborative benefits and operational performance of .758 ($p<.001$). The R^2 values for the endogenous constructs in the model were as follows: collaborative benefits -- .83, financial performance -- .54, operational performance -- .58.

Hypothesis four predicted the positive relationship between supply chain collaboration and collaborative benefits would be strengthened by collaborative process competence. The moderated path coefficient was .071 and statistically insignificant indicating collaborative process competence does not have an effect on the relationship between supply chain

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collaboration and collaborative benefits. Hypothesis five postulated that the positive relationship between collaboration and collaborative benefits would be enhanced by goal congruence between a firm and its supply chain partner. This hypothesis was not supported. Finally, hypothesis six predicted that partner interdependence would strengthen the positive relationship between supply chain collaboration and collaborative benefits. Results indicate that this too was not the case, failing to support hypothesis six.

As a post-hoc test, the research team noted that collaborative process competence was the only moderator to share a significant relationship with collaborative benefits with a standardized path coefficient of .27 ($p<.01$). Because of this finding, and the lack of a significant moderated relationship between collaboration and collaborative benefits, a mediation analysis was performed between the three constructs of supply chain collaboration, collaborative process competence, and collaborative benefits. This analysis was performed due to realizing collaborative process competence did not have an on impact on "when" the relationship between supply chain collaboration and collaborative benefits was significant; but it may possibly help establish "why" or "how" the relationship is significant (Frazier et al., 2004). Bootstrapping analysis indicates collaborative process competence does play a role in explaining the relationship between supply chain collaboration and collaborative benefits as the indirect effects of collaboration on collaborative benefits is significant in the presence of collaborative process competence (Preacher and Hayes, 2004; Zhao et al., 2010). This finding deserves more attention in the future.

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4.7 DISCUSSION, IMPLICATIONS, AND FUTURE DIRECTIONS

The research utilizes a process oriented conceptualization of supply chain collaboration (cooperation, sharing information, and interconnected procedures and operations) to show a relationship between collaboration and collaborative benefits. One of the reasons to view supply chain collaboration from a process perspective is the understanding that not all collaborations may have a long-term relationship underpinning the partnership. Zacharia et al. (2009) investigated episodic supply chain collaborations for projects with a defined time-frame. In this instance, the collaboration and its immediate outcomes were the focus of the collaborative arrangement and not the long-term relational aspect of the endeavor. Additionally, collaboration at the process level has the potential to lead to immediate, actionable operational success (Richey et al., 2012). This perspective supports removing the direct relational aspects of supply chain collaboration and instead further investigating its operational nature. To be sure, relational facets play a role in collaboration; but they may be more apparent at a supportive or theoretical foundation level. An operational focus on supply chain collaboration may reduce expensive relationship building investments and allow collaborations to focus on the specified collaborative outcomes (Davis-Sramek et al., 2010; Whipple et al., 2010). As such, the results support the positive relationship between supply chain collaboration and collaborative benefits. This helps support and extend Cao and Zhang's (2011) initial finding that supply chain collaboration may not always share a direct relationship with firm performance. Collaborative benefits such as complementary resources, collaborative processes, and improved customer responsiveness and flexibility may be a better indicator of collaborative outcomes than specific financial performance. While some researchers and practitioners may question the immediate economic benefits of collaboration; considering operational benefits provides an alternative view of supply

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chain collaboration (Cao and Zhang, 2011). In other words, collaborative benefits expands a firm's opportunity set and may provide competitive advantages and an increased chance for firm success (Jap, 1999).

Understanding this, the study's current results also support a connection between collaborative benefits and both firm financial and operational performance. Value from collaborative endeavors must impact a firm's bottom line (Whipple et al., 2010; Daugherty, 2011). One way for collaborations to be deemed a success is if collaborative benefits impact firm performance. Understanding this relationship may lead firms to appreciate collaborations for their outcomes, even if the results on performance are indirect (Lambert et al., 1996; Fawcett et al., 2008). Generating value and synthesizing resources and capabilities across firms is the intent behind supply chain collaboration (Stank et al., 2001b; Esper et al., 2010). Collaborative benefits are an additional avenue for value development and something that practitioners should investigate further when looking at the contributions from supply chain collaboration and effect on performance.

With the understanding that collaborative benefits can positively impact both firm and operational performance; the link between supply chain collaboration and collaborative benefits was further investigated. Strengthening the relationship between the two constructs can lead to more opportunities for firms to extract value from the jointly derived collaborative benefits. Three moderators were identified and their impact on the collaboration / collaborative benefits relationship was investigated. Collaborative process competence, goal congruence between partners, and partner interdependence did not statistically significantly moderate the supply chain collaboration / collaborative benefits link. Collaborative process competence did share a direct positive relationship with collaborative benefits indicating the construct does provide some value

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to firms. A firm's ability to select appropriate partners and ensure a smooth collaboration aids in generating collaborative benefits. Contrary to predicted hypotheses, goal congruence and partner interdependence had no bearing on the current study's results. These findings are surprising, but one may wonder how much congruence and interdependence impact a collaboration that is already functioning. Rather ensuring partners are interdependent and have congruent goals may be more pressing during collaboration formation and not during the actual collaborative process. Additionally collaborative process competence is a firm level characteristic which may be more important to deriving collaborative benefits as firms realize the impact these benefits have on firm performance.

The findings provide researchers further information on supply chain collaboration and collaborative benefits. Additionally, a firm perspective in regards to supply chain collaboration may provide added clues as to what drives supply chain collaborations toward success. Do firms see collaboration as another opportunity to improve competitive positioning? If so, firms may realize that the collaborative benefits provide value which impacts bottom line performance. For practitioners, recognizing that collaborations provide value may be an easy sell. However, these practitioners also know that collaborations are expensive and not always successful. Understanding that collaborative benefits can provide additional opportunity, firms may have further impetus to provide the proper resources to ensure the supply chain collaborations undertaken do in fact succeed.

An interesting extension to the current study would be to collect matched dyadic (or triadic) data between members of supply chain collaborations. Do "buyers" and "suppliers" derive the same value from collaborative benefits? Do collaborative benefits exist to multiple members within a supply chain? The answer seems to be yes, but the performance impact

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deserves more attention. Additionally, do moderators exist which either strengthen or lessen the relationship between supply chain collaboration and collaborative benefits? While additional study on collaboration is still needed, the current study provides further support for the idea of collaborative benefits or advantage derived from supply chain collaboration.

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4.8 Appendix

Construct	Label	Item	Mean	Standard Deviation	Cronbach's Alpha	Adapted From
Supply Chain Collaboration						
To what extent do you agree/disagree with the following statements in regards to your firm and this supply chain partner. Respondents instructed to think about a relationship their firm shares with its most important supply chain partner (1 = Strongly Disagree, 4 = Neither Agree Nor Disagree, 7 = Strongly Agree)					0.83	Stank et al. (2001)
	SCC1	My firm has developed performance measures that incorporate the performance of this supply chain partner	5.17	1.27		
	SCC2	My firm experiences improved performance by integrating operations with this supply chain partner	5.23	1.25		
	SCC3	My firm has a supply chain arrangement with this partner that operates under the principle of shared rewards and risks	4.88	1.54		
	SCC4	My firm has increased operational flexibility through our relationship with this supply chain partner	5.25	1.20		
	SCC5	My firm benchmarks best practices/processes and shares results with this supply chain partner	5.07	1.47		
Collaborative Benefits						
To what extent do you agree/disagree with the following statements in regards to your firm and this supply chain partner. Respondents instructed to think about a relationship their firm shares with its most important supply chain partner (1 = Strongly Disagree, 3 = Neither Agree Nor Disagree, 5 = Strongly Agree)					0.84	Cao and Zhang (2011)
	CB1	Our firm and this supply chain partner meet targeted unit costs for the products or services we offer	3.90	0.76		
	CB2	Our firm and this supply chain partner meet productivity standards	4.03	0.71		
	CB3	Our firm and this supply chain partner meet different customer volume requirements efficiently	3.90	0.82		
	CB4	Our firm and this supply chain partner have integrated knowledge bases and know-how	3.97	0.85		
	CB5	Our firm and this supply chain partner have integrated marketing efforts	3.54	1.10		
	CB6	Our firm and this supply chain partner have integrated production systems	3.60	1.04		
	CB7	Our firm and this supply chain partner have helped each other improve product quality	3.89	0.87		
Collaborative Process Competence						
To what extent do you agree/disagree with the following statements in regards to your firm (1 = Strongly Disagree, 4 = Neither Agree Nor Disagree, 7 = Strongly Agree)					0.89	Spekman et al. (1997) Zacharia et al. (2011)
	CPC1	In general my organization has the ability to select partners we can collaborate with	5.37	1.32		
	CPC2	In general my organization has the ability to learn from prior collaboration experiences	5.72	1.22		
	CPC3	In general my organization has the ability to recognize and resolve conflicts as they arise in collaboration efforts	5.64	1.14		
	CPC4	In general my organization has the ability to select the right individuals for collaboration assignments	5.46	1.18		
	CPC5	In general my organization has the ability to establish processes that monitor and manage collaboration efforts	5.48	1.21		

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Appendix cont.

Goal Congruence					
To what extent do you agree/disagree with the following statements in regards to your firm and this supply chain partner. Respondents instructed to think about a relationship their firm shares with its most important supply chain partner (1 = Strongly Disagree, 4 = Neither Agree Nor Disagree, 7 = Strongly Agree)				0.87	Cao and Zhang (2011)
GC1	Our firm and this supply chain partner have agreement on the goals of the supply chain	5.45	1.34		
GC2	Our firm and this supply chain partner have agreement on the importance of collaboration across the supply chain	5.50	1.19		
GC3	Our firm and this supply chain partner have agreement on the importance of improvements that benefit the supply chain as a whole	5.51	1.26		
GC4	Our firm and this supply chain partner agree that our individual firm goals can be achieved through working towards the goals of the supply chain	5.47	1.16		
Partner Interdependence					
To what extent do you agree/disagree with the following statements in regards to your firm and this supply chain partner. Respondents instructed to think about a relationship their firm shares with its most important supply chain partner (1 = Strongly Disagree, 4 = Neither Agree Nor Disagree, 7 = Strongly Agree)				0.79	Jap (1999) Zacharia et al. (2011)
PI1	Our firms are dependent on each other for an effective solution	5.29	1.34		
PI2	Our firms need knowledge the other possesses	5.17	1.33		
PI3	Our firms need skills the other possesses	5.09	1.45		
PI4	Our firms need each other to reach our individual firm goals	5.34	1.26		
Financial Performance					
Please indicate your firm's performance against stated objectives of the firm in the following areas (1 = Much Worse, 4 = Same As, 7 = Much Better)				0.95	Flynn et al. (2010)
FP1	Pre-Tax Return on Assets	4.94	1.10		
FP2	Return on Investment	5.17	1.24		
FP3	Growth in Return on Investment	5.16	1.26		
FP4	Growth in Sales	5.28	1.25		
FP5	Return on Sales	5.17	1.18		
FP6	Growth in Return on Sales	5.24	1.21		
Operational Performance					
Please indicate your firm's performance against stated objectives of the firm in the following areas (1 = Much Worse, 4 = Same As, 7 = Much Better)				0.87	Grawe et al. (2011)
OP1	On-Time Delivery	5.43	1.06		
OP2	Inventory Turnover	5.30	1.20		
OP3	Customer Satisfaction	5.59	1.11		
OP4	Low Damage Levels	5.31	1.23		
OP5	Order Cycle Time Variability	5.23	1.17		

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4.9 References

Anderson, J. C., and Gerbing, D. W. 1988. "Structural equation modeling in practice: A review and recommended two-step approach." *Psychological Bulletin* 103(3):411-423.

Ansoff, H. I., and McDonnell, E. J. 1988. *The New Corporate Strategy*. New York: Wiley

Armstrong, J. S., and Overton, T. 1977. "Estimating Nonresponse Bias in Mail Surveys." *Journal of Marketing Research* 14(3):396-402.

Autry, C. W., Grawe, S. J., Daugherty, P. J., and Richey, R. G. 2010. "The Effects of Technological Turbulence and Breadth on Supply Chain Technology Acceptance and Adoption." *Journal of Operations Management* 28(6):522-536.

Bagchi, P. K., Ha, B. C., Skjoett-Larsen, T., and Soerensen, L. B. 2005. "Supply Chain Integration: A European Survey." *International Journal of Logistics Management* 16(2):275-294.

Barney, J. B. 1991. "Firm Resources and Sustained Competitive Advantage." *Journal of Management* 17(1):99-120.

Bowersox, D. J., and Daugherty, P. J. 1987. "Emerging patterns of logistical organizations." *Journal of Business Logistics* 8(1):46-60.

Bowersox, D. J., Closs, D. J., and Stank, T. P. 1999. *21st Century Logistics: Making Supply Chain Integration a Reality*. Oak Brook, IL: Council of Logistics Management.

Cao, M., Vonderembse, M. A., Zhang, Q., and Ragu-Nathan, T. 2010. "Supply Chain Collaboration: Conceptualisation and Instrument Development." *International Journal of Production Research* 48(22):6613-6635.

Cao, M., and Zhang, Q. 2011. "Supply Chain Collaboration: Impact on Collaborative Advantage and Firm Performance." *Journal of Operations Management* 29(3):163-180.

Chen, H., Ellinger, A. E., and Tian, Y. 2011. "Manufacturer–Supplier Guanxi Strategy: An Examination of Contingent Environmental Factors." *Industrial Marketing Management* 40(4):550-560.

Churchill Jr., G. A. 1979. "A Paradigm for Developing Better Measures of Marketing Constructs." *Journal of Marketing Research* 16(1):64-73.

Cooper, M. C., and Ellram, L. M. 1993. "Characteristics of Supply Chain Management and the Implications for Purchasing and Logistics Strategy." *International Journal of Logistics Management* 4(2):13-24.

www.manaraa.com

Corsten, D., and Kumar, N. 2005. "Do Suppliers Benefit from Collaborative Relationships with Large Retailers? An Empirical Investigation of Efficient Consumer Response Adoption." *Journal of Marketing* 69(3):80-94.

Cousins, P. D., Handfield, R. B., Lawson, B., and Petersen, K. J. 2006. "Creating Supply Chain Relational Capital: The Impact of Formal and Informal Socialization Processes." *Journal of Operations Management* 24(6):851-863.

Cronbach, L. J. 1951. "Coefficient Alpha and the Internal Structure of Tests." *Psychometrika* 16(3):297-334.

Daugherty, P. J., Richey, R. G., Roath, A. S., Min, S., Chen, H., Arndt, A. D., and Genchev, S. E. 2006. "Is Collaboration Paying Off for Firms?" *Business horizons* 49(1):61-70.

Daugherty, P. J. 2011. "Review of Logistics and Supply chain Relationship Literature and Suggested Research Agenda." *International Journal of Physical Distribution & Logistics Management* 41(1):16-31.

Davis-Sramek, B., Germain, R., and Stank, T. P. 2010. "The Impact of Order Fulfillment Service on Retailer Merchandising Decisions in the Consumer Durables Industry." *Journal of Business Logistics* 31(2):215-230.

Dillman, D. A. 2000. *Mail and Web Based Survey: The Tailored Design Method.* New York: Wiley.

Dyer, J. H., and Singh, H. 1998. "The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage." *The Academy of Management Review* 23(4):660-679.

Ellram, L. M., Tate, W. L., and Billington, C. 2008. "Offshore Outsourcing of Professional Services: A Transaction Cost Economics Perspective." *Journal of Operations Management* 26(2):148-163.

Esper, T., Ellinger, A., Stank, T., Flint, D., and Moon, M. 2010. "Demand and Supply Integration: A Conceptual Framework of Value Creation Through Knowledge Management." *Journal of the Academy of Marketing Science* 38(1):5-18.

Fawcett, S. E., and Magnan, G. M. 2002. "The Rhetoric and Reality of Supply Chain Integration." *International Journal of Physical Distribution & Logistics Management* 32(5):339-361.

Fawcett, S. E., Ogden, J. A., Magnan, G. M., and Cooper, M. B. 2006. "Organizational Commitment and Governance for Supply Chain Success." *International Journal of Physical Distribution & Logistics Management* 36(1):22-35.

www.manaraa.com

Fawcett, S. E., Magnan, G. M., and McCarter, M. W. 2008. "A Three-Stage Implementation Model for Supply Chain Collaboration." *Journal of Business Logistics* 29(1):93-112.

Fawcett, S. E., Fawcett, A. M., Watson, B. J., and Magnan, G. M. 2012. "Peeking Inside the Black Box: Toward an Understanding of Supply Chain Collaboration Dynamics." *Journal of Supply Chain Management* 48(1):44-72.

Flynn, B. B., Huo, B., and Zhao, X. 2010. "The Impact of Supply Chain Integration on Performance: A Contingency and Configuration Approach." *Journal of Operations Management* 28(1):58-71.

Frazier, G. L. 1983. "On the Measurement of Interfirm Power in Channels of Distribution." *Journal of Marketing Research* 20(2):158-166.

Frazier, P. A., Tix, A. P., and Barron, K. E. 2004. "Testing Moderator and Mediator Effects in Counseling Psychology Research." *Journal of Counseling Psychology* 51(1):115-134.

Goldsby, T. J., Michael Knemeyer, A., Miller, J. W., and Wallenburg, C. M. 2013. "Measurement and Moderation: Finding the Boundary Conditions in Logistics and Supply Chain Research." *Journal of Business Logistics* 34(2):109-116.

Gosain, S., Malhotra, A., and El Sawy, O. A. 2004. "Coordinating for Flexibility in E-Business Supply Chains." *Journal of Management Information Systems* 21(3):7-45.

Grawe, S. J., Daugherty, P. J., and Roath, A. S. 2011. "Knowledge Synthesis and Innovative Logistics Processes: Enhancing Operational Flexibility and Performance." *Journal of Business Logistics* 32(1):69-80.

Grawe, S. J., Daugherty, P. J., and Dant, R. P. 2012. "Logistics Service Providers and Their Customers: Gaining Commitment Through Organizational Implants." *Journal of Business Logistics* 33(1):50-63.

Hair, J. F. J., Black, B., Babin, B., Anderson, R. E., and Tatham, R. L. 2006. *Multivariate Data Analysis*. New York: MacMillan Publishing Co. .

Handfield, R. B., and Bechtel, C. 2002. "The Role of Trust and Relationship Structure in Improving Supply Chain Responsiveness." *Industrial Marketing Management* 31(4):367-382.

Harman, H. H. 1976. *Modern Factor Analysis*. Chicago: The University of Chicago Press.

Hartmann, E., and De Grahl, A. 2011. "The Flexibility of Logistics Service Providers and Its Impact on Customer Loyalty: An Empirical Study." *Journal of Supply Chain Management* 47(3):63-85.

www.manaraa.com

———. 2012. "Logistics Outsourcing Interfaces: The Role of Customer Partnering Behavior." *International Journal of Physical Distribution & Logistics Management* 42(6):526-543.

Hatcher, L. 1994. *A Step-by-Step Approach to Using SAS for Factor Analysis and Structural Equation Modeling*. Cary, NC: SAS Publishing.

Iacobucci, D. 2010. "Structural Equations Modeling: Fit Indices, Sample Size, and Advanced Topics." *Journal of Consumer Psychology* 20(1):90-98.

Jap, S. D. 1999. "Pie-Expansion Efforts: Collaboration Processes in Buyer-Supplier Relationships." *Journal of Marketing Research* 36(4):461-475.

Jap, S. D., and Anderson, E. 2003. "Safeguarding Interorganizational Performance and Continuity under Ex Post Opportunism." *Management Science* 49(12):1684-1701.

Kumar, N., Scheer, L. K., and Steenkamp, J.-B. E. M. 1995. "The Effects of Perceived Interdependence on Dealer Attitudes." *Journal of Marketing Research* 32(3):348-356.

Lambe, C. J., Spekman, R. E., and Hunt, S. D. 2002. "Alliance Competence, Resources, and Alliance Success: Conceptualization, Measurement, and Initial Test." *Journal of the Academy of Marketing Science* 30(2):141-158.

Lambert, D. M., Emmelhainz, M., and Gardner, J. T. 1996. "Developing and Implementing Supply Chain Partnerships." *International Journal of Logistics Management* 7(2):1-18.

Larsson, R., and Finkelstein, S. 1999. "Integrating Strategic, Organizational, and Human Resource Perspectives on Mergers and Acquisitions: A Case Survey of Synergy Realization." *Organization Science* 10(1):1-26.

Lavie, D. 2006. "The Competitive Advantage of Interconnected Firms: An Extension of the Resource-Based View." *Academy of Management Review* 31(3):638-658.

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

Lejeune, M. A., and Yakova, N. 2005. "On Characterizing the 4 C's in Supply Chain Management." *Journal of Operations Management* 23(1):81-100.

Li, S., Rao, S. S., Ragu-Nathan, T. S., and Ragu-Nathan, B. 2005. "Development and validation of a measurement instrument for studying supply chain management practices." *Journal of Operations Management* 23(6):618-641.

Lindell, M. K., and Whitney, D. J. 2001. "Accounting for Common Method Variance in Cross-sectional Research Designs." *Journal of Applied Psychology* 86(1):114-121.

Mentzer, J. T., Min, S., and Zacharia, Z. G. 2000. "The Nature of Interfirm Partnering in Supply Chain Management." *Journal of Retailing* 76(4):549-568.

www.manaraa.com

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., and Zacharia, Z. G. 2001. "Defining Supply Chain Management." *Journal of Business Logistics* 22(2):1-25.

Min, S., Roath, A. S., Daugherty, P. J., Genchev, S. E., Chen, H., Arndt, A., and Richey Jr, R. G. 2005. "Supply Chain Collaboration: What's Happening?" *International Journal of Logistics Management* 16(2):237-256.

Mishra, A. A., and Shah, R. 2009. "In Union Lies Strength: Collaborative Competence in New Product Development and its Performance Effects." *Journal of Operations Management* 27(4):324-338.

Nauta, A., and Sanders, K. 2001. "Causes and Consequences of Perceived Goal Differences between Departments within Manufacturing Organizations." *Journal of Occupational and Organizational Psychology* 74(3):321-342.

Nunnally, J. C., and Bernstein, I. H. 1994. *Psychometric Theory*. 3rd ed. New York: McGraw-Hill.

Nyaga, G. N., Whipple, J. M., and Lynch, D. F. 2010. "Examining Supply Chain Relationships: Do Buyer and Supplier Perspectives on Collaborative Relationships Differ?" *Journal of Operations Management* 28(2):101-114.

Petersen, K. J., Handfield, R. B., and Ragatz, G. L. 2005. "Supplier Integration into New Product Development: Coordinating Product, Process and Supply Chain Design." *Journal of Operations Management* 23(3–4):371-388.

Podsakoff, P. M., and Organ, D. W. 1986. "Self-Reports in Organizational Research: Problems and Prospects." *Journal of Management* 12(4):531-544.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., and Podsakoff, N. P. 2003. "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies." *Journal of Applied Psychology* 88(5):879-903.

Podsakoff, P. M., MacKenzie, S. B., and Podsakoff, N. P. 2012. "Sources of Method Bias in Social Science Research and Recommendations on How to Control It." *Annual Review of Psychology* 63(1):539-569.

Preacher, K. J., and Hayes, A. F. 2004. "SPSS and SAS Procedures for Estimating Indirect Effects in Simple Mediation Models." *Behavior Research Methods, Instruments, and Computers* 36(4):717-731.

Priem, R. L., and Swink, M. 2012. "A Demand-Side Perspective on Supply Chain Management." *Journal of Supply Chain Management* 48(2):7-13.

www.manaraa.com

Ralston, P., Grawe, S., and Daugherty, P. 2013. "Logistics Salience's Impact on Logistics Capabilities and Performance." *International Journal of Logistics Management* 24(2):136-152.

Richey, R. G., Roath, A. S., Whipple, J. M., and Fawcett, S. E. 2010. "Exploring a Governance Theory of Supply Chain Management: Barriers and Facilitators to Integration." *Journal of Business Logistics* 31(1):237-256.

Richey, R. G., Adams, F. G., and Dalela, V. 2012. "Technology and Flexibility: Enablers of Collaboration and Time-Based Logistics Quality." *Journal of Business Logistics* 33(1):34-49.

Rindfleisch, A., and Heide, J. B. 1997. "Transaction Cost Analysis: Past, Present, and Future Applications." *Journal of Marketing* 61(4):30-54.

Rosenzweig, E. D., Roth, A. V., and Dean Jr, J. W. 2003. "The Influence of an Integration Strategy on Competitive Capabilities and Business Performance: An Exploratory Study of Consumer Products Manufacturers." *Journal of Operations Management* 21(4):437-456.

Sabath, R. E., and Fontanella, J. 2002. "The Unfulfilled Promise of Supply Chain Collaboration." *Supply Chain Management Review* 6(4):24-29.

Schoenherr, T., and Swink, M. 2012. "Revisiting the Arcs of Integration: Cross-validations and Extensions." *Journal of Operations Management* 30(1):99-115.

Simatupang, T. M., and Sridharan, R. 2005. "The Collaboration Index: A Measure for Supply Chain Collaboration." *International Journal of Physical Distribution and Logistics Management* 35(1):44-62.

Skjoett-Larsen, T., Thernøe, C., and Andresen, C. 2003. "Supply Chain Collaboration: Theoretical Perspectives and Empirical Evidence." *International journal of physical distribution & logistics management* 33(6):531-549.

Spekman, R. E., Salmond, D. J., and Lambe, C. J. 1997. "Consensus and Collaboration: Norm-regulated Behaviour in Industrial Marketing Relationships." *European Journal of Marketing* 31(11/12):832-856.

Stank, T. P., Keller, S. B., and Daugherty, P. J. 2001. "Supply Chain Collaboration and Logistical Service Performance." *Journal of Business Logistics* 22(1):29-48.

Swink, M., Narasimhan, R., and Wang, C. 2007. "Managing Beyond the Factory Walls: Effects of Four Types of Strategic Integration on Manufacturing Plant Performance." *Journal of Operations Management* 25(1):148-164.

www.manaraa.com

Vickery, S. K., Jayaram, J., Droge, C., and Calantone, R. 2003. "The Effects of an Integrative Supply Chain Strategy on Customer Service and Financial Performance: An Analysis of Direct Versus Indirect Relationships." *Journal of Operations Management* 21(5):523-539.

Whipple, J. M., Lynch, D. F., and Nyaga, G. N. 2010. "A Buyer's Perspective on Collaborative Versus Transactional Relationships." *Industrial Marketing Management* 39(3):507-518.

Williamson, O. E. 1973. "Markets and Hierarchies: Some Elementary Considerations." *The American Economic Review* 63(2):316-325.

Williamson, O. E. 1985. *The Economic Intstitutions of Capitalism*. New York: Free Press.

Williamson, O. E. 1991. "Comparative Economic Organization: The Analysis of Discrete Structural Alternatives." *Administrative Science Quarterly* 36(2):269-296.

———. 2008. "Outsourcing: Transaction Cost Economics and Supply Chain Management." *Journal of Supply Chain Management* 44(2):5-16.

Zacharia, Z. G., Nix, N. W., and Lusch, R. F. 2009. "An Analysis of Supply Chain Collaborations and their Effect on Performance Outcomes." *Journal of Business Logistics* 30(2):101-124.

———. 2011. "Capabilities That Enhance Outcomes of an Episodic Supply Chain Collaboration." *Journal of Operations Management* 29(6):591-603.

Zhao, X., Huo, B., Flynn, B. B., and Yeung, J. H. Y. 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.

Zhao, X., Lynch, J., John G , and Chen, Q. 2010. "Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis." *Journal of Consumer Research* 37(2):197-206.

Zhao, X., Huo, B., Selen, W., and Yeung, J. H. Y. 2011. "The Impact of Internal Integration and Relationship Commitment on External Integration." *Journal of Operations Management* 29(1-2):17-32.

www.manaraa.com

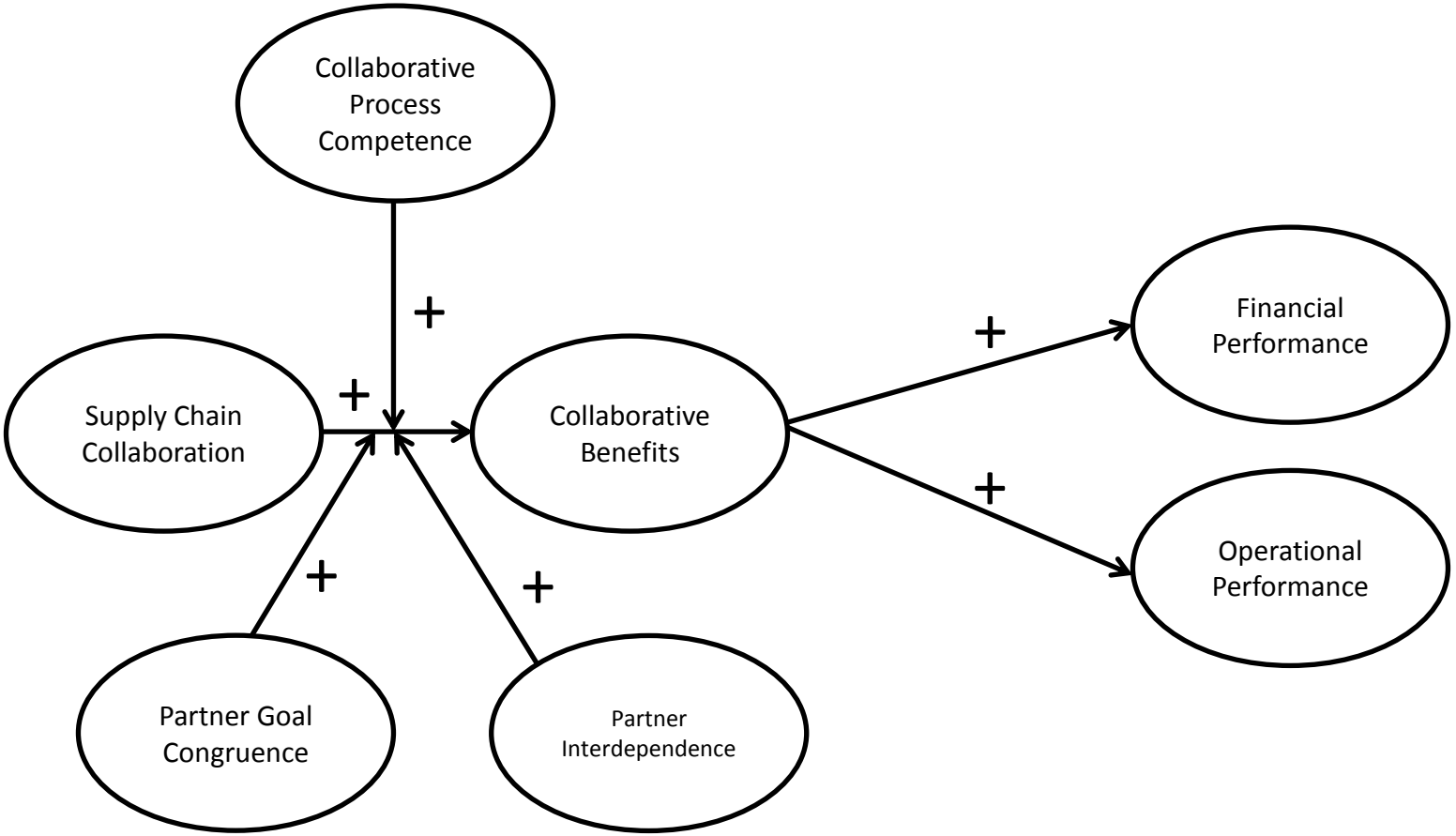

Figure 2: Theoretical model: Collaborative benefits

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Table 8: Chapter 4: Factor loadings and Cronbach Alpha

Constructs	Cronbach's Alpha	Range of Factor Loadings
Supply Chain Collaboration	0.83	.62 to .75
Collaborative Benefits	0.84	.59 to .71
Collaborative Process Competence	0.89	.70 to .84
Goal Congruence	0.87	.78 to .82
Partner Interdependence	0.79	.65 to .75
Financial Performance	0.95	.83 to .89
Operational Performance	0.87	.66 to .81

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Table 9: Chapter 4: Model results

Direct with Moderators		
	CFA	SEM
X2/DF	2.027	2.168
CFI	0.9	0.88
TLI	0.88	0.86
AIC	1419.358	1501.814
RMSEA	0.065	0.069
	SCC->CB	0.514***
	CPC->CB	0.244**
	GC->CB	0.136
	PI->CB	0.104
	CB->FP	.733***
	CB->OP	.758***
	R^2	
	CB	0.829
	FP	0.537
	OP	0.575

Model 1: Collaborative Process Competence		
	SEMw/CPC	SEMw/MOD
X2/DF	2.285	2.224
CFI	0.9	0.88
TLI	0.88	0.86
AIC	966.185	1296.902
RMSEA	0.073	0.071
SCC->CB	.681***	.666***
CPC->CB	.274**	.324**
SCCxCPC	N/A	0.071
CB->FP	0.741***	0.742***
CB->OP	0.764***	0.764***
R^2		
CB	0.815	0.819
FP	0.55	0.551
OP	0.584	0.584

Model 2 Goal Congruence		
	SEMw/GC	SEMw/MOD
X2/DF	2.535	2.477
CFI	0.89	0.87
TLI	0.86	0.85
AIC	980.66	1257.408
RMSEA	0.079	0.078
SCC->CB	.687***	.677***
GC->CB	.231 (p< .10)	0.249
SCCxGC	N/A	0.015
CB->FP	.736***	.736***
CB->OP	.757***	.756***
R^2		
CB	0.799	0.799
FP	0.541	0.541
OP	0.573	0.572

Model 3: Partner Interdependence		
	SEM w/ PI	SEM w/ MOD
X2/DF	2.443	2.288
CFI	0.88	0.87
TLI	0.86	0.85
AIC	951.266	1176.839
RMSEA	0.077	0.073
SCC->CB	.811***	.801***
PI->CB	0.104	0.123
SCCxPI	N/A	0.024
CB->FP	0.738***	.738***
CB->OP	0.752***	.752***
R^2		
CB	0.789	0.79
FP	0.545	0.545
OP	0.565	0.565

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CHAPTER 5: GENERAL CONCLUSIONS

The intent of the current dissertation was to further our understanding of supply chain collaboration. Chapter 2 saw the synthesis of an in-depth literature review and set of qualitative interviews to provide insights on supply chain collaboration. Comparing interview responses to past research, a number of future research topics were presented. These included understanding uncertainty's impact on supply chain collaboration as well as looking to identify mediators between supply chain collaboration and its relationship with firm performance which provided the impetus for the research studies discussed in Chapters 3 and 4. Chapter 3 saw the investigation of a number of different forms of uncertainty (behavioral, environmental, and technological) and their relationship with supply chain collaboration. Technological uncertainty shared the only significant relationship with supply chain collaboration. However, the uncertainty relationships would change in the presence of specific moderators. Number of suppliers moderated the interaction between behavioral uncertainty and supply chain collaboration, making the relationship statistically significant. When competitive intensity moderated the environmental uncertainty / supply chain collaboration link, the relationship also became statistically significant. The moderators help establish boundary conditions around certain relationships and provide firms more information, and tools, to impact their business. Chapter 4 saw the introduction of a mediator to the supply chain collaboration / performance relationship termed collaborative benefits. This mediator was introduced to help explain additional reasons why firms may collaborate. Collaborative benefits fully mediates the relationship between collaboration and performance in our model. This indicates firms may need to rethink their expectations of collaborative relationships.

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