

SUPPLY CHAIN PROCESS INTEGRATION: A THEORETICAL FRAMEWORK

by

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Timothy D. Landry*The University of Alabama in Huntsville***INTRODUCTION**

As the concept of supply chain management (SCM) becomes more widely accepted, *supply chain integration* is gaining more attention among both practitioners and academics. While SCM encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities, supply chain integration refers to linking major business functions and business processes within and across companies into a cohesive and high-performing business model (CSCMP Glossary of Terms 2009). In plain words, supply chain integration is a key component of SCM. The positive outcomes of supply chain integration have been supported by previous research studies (Gimenez and Ventura 2003; Stank, Daugherty, and Ellinger 1999), but effective integration implementation remains a mystery for many companies (Bowersox, Closs, and Stank 1999).

Academic research has also found that achieving either internal or external integration can be difficult (Bowersox, Closs, and Stank 2000; Fawcett and Magnan 2002). Fawcett and Magnan (2002) pointed out that most of the companies they studied were still at the early stages of inter-company collaboration, because managers spent significant resources navigating the "waters of their own harbor" rather than forming external integrative programs. Even within the firm, low levels of progress have typically been made toward cross-functional integration. Too often different departments have worked independently (Bowersox, Closs, and Stank 2000).

These implementation process challenges suggest a better understanding of supply chain integration is needed. Review of SCM and logistics literatures revealed the lack of a clear delineation of the concept itself. The term integration is often used interchangeably with other related but distinct concepts such as cooperation and collaboration. Most importantly, a well-grounded theoretical framework of supply chain integration is still missing, and certain aspects of supply chain integration have not been adequately studied. For example, Pagell (2004) pointed out that study of the antecedents of integration is lacking. Furthermore, the conceptual "black box" between supply chain integration and superior performance needs to be more fully examined. Thus, the current study was undertaken to address these research gaps. The rest of the paper is organized as follows. First, existing literature (including the academic literature supplemented with selected trade publications) is reviewed and synthesized to identify the critical angles to better understand supply chain integration. Then, the results of interviews with practitioners are used to identify two key drivers of supply chain integration and provide validity for extant concepts' usefulness and their appropriateness for inclusion in a theoretical development. Next, drawing upon relevant theories in other fields such as strategic management and marketing, a conceptual model is proposed and detailed proposition development is presented. Finally, the implications of this study are discussed.

UNDERSTANDING SUPPLY CHAIN PROCESS INTEGRATION

Integration has been recognized as vital to SCM. Many important studies have contributed to better understanding of this phenomenon. For example, Bowersox, Closs, and Stank (1999) proposed a comprehensive framework and categorized supply chain integration into six types: customer integration, internal integration, material service supplier integration, technology and planning integration, measurement integration, and relationship integration. While this approach provides detailed insights to supply chain integration across settings, conceptual overlaps between types of integration (e.g., relationship integration and customer/supplier integration) could cause confusion during implementation. Therefore, this paper focuses on developing a parsimonious, yet practical, understanding of supply chain integration. In the first step of the research, we carefully reviewed the literature to better understand the critical concepts behind supply chain integration. Two ideas that were prevalent in existing research on supply chain integration were an internal-external perspective and a process view. We review the literature on each next.

Internal-External Perspective on Supply Chain Integration

Although integration is often mentioned as a generic term without clearly defined boundaries, an internal-external perspective is essential to understanding the phenomenon. Early integration literature mainly focused on the internal—i.e., the activities *within* a firm. For example, in their seminal work, Lawrence and Lorsch (1967, p. 11) took an internal perspective and defined integration as “the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demands of the environment.” Much of the SCM and logistics research examined internal inter-functional integration, focusing on the interaction and collaboration between different departments (Chen, Mattioda, and Daugherty 2007; Ellinger, Daugherty, and Keller 2000; Kahn and Mentzer 1998). Another stream of research, however, examined integration with external partners, highlighting the importance of buyer/seller cooperation for creating utility (Rich and Hines 1997; Vachon and Klassen 2006).

The fact that SCM is a boundary-spanning activity implies that both cross-functional and inter-organizational management efforts are important (Bowersox, Closs, and Stank 1999; Day 1994). Stevens (1989) emphasized that true supply chain integration includes both upstream and downstream players, while internal integration provides the foundation for both. Both internal and external integration can contribute to achieving reductions in costs, stock-outs, and lead-time, and can lead to competitive advantage (Gimenez and Ventura 2003). Therefore, a firm is likely to obtain superior performance when achieving high levels of integration both internally and externally.

Internal and external integration are distinct but closely related concepts. Clearly, it is beneficial to examine *both* when studying supply chain integration (Rodrigues, Stank, and Lynch 2004; Stank, Keller, and Closs 2001). Simply delineating these boundaries, however, is not sufficient; integration’s drivers and the essence of “integrating” must be understood for useful theory to emerge.

Process View of Supply Chain Integration

Process management is not new. The concept of organizing firm activities as business processes was introduced in the late 1980’s and became popular in the early 1990’s (Davenport 1993; Davenport, Hammer, and Metsisto 1989; Hammer and Mangurian 1987). A business *process* refers to a structured and measured set of activities with specified business outcomes for customers (Davenport and Beers 1995). Zairi (1997, p. 64) further defined business process management as: “a structured approach to analyze and continually improve fundamental activities such as manufacturing, marketing, communications and other major elements of a company’s operation.” With a process approach, the focus of every process is to meet customers’ requirements through effective management of the processes. Functional experts are still critical, but these individuals are more likely to work in process teams (Cooper, Lambert, and Pagh 1997).

Many top companies—3M, Cisco, and Texas Instruments—have embraced a process management approach and become fast and flexible as a result (McCormack and Johnson 2001). The SCM framework developed by the Global Supply Chain Forum clearly states that all major business processes and relevant sub-processes must be identified and understood explicitly for effective implementation of process management (Lambert 2004). The process approach toward supply chain integration is also manifested in the Supply Chain Council’s Supply Chain Operations Reference-model (SCOR), which suggests that business should be managed based on key processes—

plan, source, make, deliver, and return (Stewart 1997). Similarly, Porter (1985) used processes as the building blocks to develop the well-known value chain framework.

Importantly, Hammer (2001) pointed out that it is in the integration of business processes across firms in the supply chain where the real “gold” can be found. Better managing business processes through process integration within and across members of the supply chain can make transactions and relationship structures more efficient and effective (Lambert 2004). Stock (2002) suggested a similar view: integration of processes within and between firms in the supply chain is the key to SCM success.

Key Antecedents of Supply Chain Process Integration

The previous discussion centered on the internal-external foci of integration studies and the process-oriented viewpoints espoused by supply chain theorists; however, little consensus exists as to the meaning of supply chain process integration. Thus, in part to provide support for the usefulness of the aforementioned concepts, and in part to further address the antecedents and consequences of supply chain process integration, input was sought from supply chain managers. This is in line with the scientific logistics research approach proposed by Mentzer and Kahn (1995). Specifically, a qualitative study including telephone interviews and written open-ended survey questions was conducted in both China and the U.S. Collecting data across countries is meaningful and important since the results can be generalized to a larger extent. China was selected for this study because it has emerged as an economic powerhouse in recent years and many Chinese manufacturers have become integral parts of global supply chains.

Twenty executives (all Presidents, Vice Presidents, or General Managers) in the Chinese consumer electronics industry were interviewed via telephone. The approach suggested by Silverman (2000) was followed to conduct the interviews. Each interview lasted about 45-60 minutes. Because of the exploratory nature of the study, interviews used a semi-structured format with only two main questions: (1) “What does supply chain integration mean to you?” and (2) “In your opinion, what are the key drivers of supply chain integration?” The interview transcripts were translated into English. Also, 60 U.S. logistics executives were surveyed in written format with similar open-ended questions. Their responses, together with the translated transcripts of Chinese managers’ interviews, were coded and analyzed separately by three academics. The coding was compared and discrepancies were discussed to achieve agreement and to ensure inter-rater reliability. In the coding process, all sentences in the transcripts were broken down into meaningful blocks. Because the goal was to identify common themes, efforts were taken to consolidate similar concepts and understandings. As a result, a small group of most frequently appearing concepts were identified as particularly relevant to supply chain process integration. Table 1 provides a summary of key findings of this qualitative study.

Although China differs from the U.S. in terms of the level of supply chain integration, analysis of the data from the two sources yielded very similar results as to the core meaning and key drivers of integration. First of all, respondents acknowledged the internal-external perspective of supply chain integration, and the analysis shows that their discussion revolved around the concept of “process.” In their response to the open-end questions, all 20 Chinese respondents and 87 % (52/60) of American respondents discussed internal and external integration separately. Even though the term “process” was not mentioned in the questions, every Chinese and American respondent’s answer either explicitly indicated or implied that supply chain integration is about “managing processes.” This confirms the literature synthesis presented previously.

Secondly, when illustrating the meaning of supply chain integration, managers focused on two subjects: linking relevant business processes smoothly and simplifying supply chains by reducing unnecessary steps. It is evident that supply chain integration involves both internal and external structural changes. Another key point that emerged is that supply chain process integration is a dynamic process that involves continuous effort by the company. Without being explicitly asked, 75 % (15/20) of Chinese respondents and 85 % (51/60) of American respondents discussed the importance of constant monitoring and continuous improvement of the current business processes. Thus, the term *supply chain process integration* is used hereafter in this paper and is defined as a set of continuous restructuring activities aimed at seamlessly linking relevant *business processes* and reducing redundant or unnecessary processes *within* and *across* firms.

TABLE 1
QUALITATIVE STUDY RESULTS ON SUPPLY CHAIN PROCESS INTEGRATION

Resulting Themes		Mentioned by Percentage of Respondents	Sample Excerpts
Key Views	Internal-External Perspective	China: 100% US: 87% Total: 65%	<ul style="list-style-type: none"> “Integrating with suppliers is quite different from integrating our internal functional areas. It is more challenging to protect certain sensitive information when working with external partners.” “With integration, our company is trying to make things simple, both for our customers and for our own employees. There were too many unnecessary steps in the past.”
	Process View	China: 100% US: 100% Total: 100%	<ul style="list-style-type: none"> “As VP of Operations, I actually look at our entire operations as one big process with a lot of related sub-processes, and I want to help our company develop integrative operations by removing some unnecessary processes, such as repetitive order entries.” “We understand our purchasing is the downstream of our suppliers’ sales. In order to make it work better, both parties have to collaborate and manage these processes together.”
	Dynamics of Supply Chain Integration	China: 75% US: 85% Total: 82.5%	<ul style="list-style-type: none"> “This is not a one-time deal, and we need to look at this and work on this constantly. We had one of the best supply chains in China a few years back, but now we need to work hard to get that advantage back.” “It is getting more difficult to keep customers happy. As a response, we have to make adjustments accordingly all the time.”
Key Drivers	Cost Orientation	China: 85% US: 81.7% Total: 82.5%	<ul style="list-style-type: none"> “Why do we want to integrate our functions? Reduce inventory and cut cost.” “Supply chain integration involves a lot of changes and requires a lot of commitment, but we expect to improve our efficiency and achieve competitiveness in the long run.”
	Customer Orientation	China: 55% US: 73.3% Total: 68.8%	<ul style="list-style-type: none"> “It’s different from years back – you do need to pay attention to customers. Our company has realized the importance of considering customers when redesigning our supply chain systems, and I think this is the right move.” “Supply chain or logistics is our weakness and there are a lot of issues, especially with customers. Now we are seriously considering about improving customer service level, and first thing we want to do is to integrate our sales and logistics.”

When asked about the key drivers of supply chain process integration, managers provided a wide range of answers, including both internal and external factors. In their responses to the open-end questions, American managers provided similar comments. However, following the coding and analysis process, two themes emerged as influential antecedents of supply chain process integration: *cost orientation* and *customer orientation*. Many respondents stated that goals such as cost savings, efficiency, and less inventory are the main drivers of their integration initiatives, while others indicated factors related to customers, such as service level and responsiveness to market needs, were the main reasons. Also, a review of integration-related articles in SCM/logistics trade publications found that *cost* and *customer* are the most frequently cited drivers to supply chain process integration (Ayers 2003; Drickhamer 2002). While these two factors have strong evidence in practice, their implications for theory will be detailed in the following section.

CONCEPTUAL FRAMEWORK

Logistics and SCM researchers have long recognized the value of borrowing and applying theories from other disciplines (Frankel et al. 2008; Rich and Hines 1997; Stock 1997, 2002). The complexity of today's supply chain systems means that it is almost impossible to thoroughly explain a supply chain phenomenon with a single theory. Thus, to provide a more thorough understanding of the emerging theoretical framework, a wide range of related literatures were consulted: strategic management, marketing, and the social sciences. In particular, four prominent theoretical perspectives—strategy-structure-performance (SSP) framework, the resource based view (RBV) of the firm, transaction cost economics (TCE), and social network analysis—are considered to be particularly relevant given the themes uncovered in our qualitative research. In the process of developing a comprehensive framework, a two-step approach was taken. First, a basic framework utilizing SSP and RBV is proposed. Next, explicit concepts derived from the qualitative research are incorporated, and specific propositions are offered.

The Basic Framework

The SSP framework has been widely used in the strategic management field. Its basic tenet is that a firm's strategy drives the development of organizational structure and process (Galunic and Eisenhardt 1994; Miles and Snow 1978). The fit between the strategy and structure of a firm leads to better performance because the structure provides the necessary systems and processes essential for successful strategy implementation (Grinyer, Yasai-Ardekani, and Al-Bazzaz 1980; Habib and Victor 1991). Logistics and SCM researchers have expanded the SSP framework to a supply chain context. For example, Defee and Stank (2005) extended SSP into the supply chain context based on Christopher's (2005) suggestion that competition is found at the supply chain level rather than the company level. Chow, Heaver, and Henriksson (1995) described the need for an appropriate organizational structure extending across firm boundaries to the whole supply chain and suggested that finding the best structure is contingent on the situation. Thus, the success of supply chain process integration is dependent on whether it can offer a strategy-structure fit. This is in keeping with suggestions by Thompson (1967) that even external relationships be considered as a part of the management of organizational structure.

The resource based view (RBV) of the firm considers firms as bundles of distinct resources (Wernerfelt 1984) and suggests that firms are able to generate rents or competitive advantage by developing unique firm resources and capabilities (Barney 1991; Day 1994). Researchers have long recognized the relevancy of RBV to logistics and SCM research. For example, Olavarrieta and Ellinger (1997) provided an in-depth review and discussion of RBV and proposed its application in strategic logistics research. As a set of critical processes and activities encompassing many functional areas, logistics is critical to a firm's resource allocation and utilization. Furthermore, firms may gain a competitive market position through developing unique logistics capabilities (Bowersox, Closs, and Stank 2000). While traditional RBV literature centered on the firm's internal resources, researchers have started to emphasize the importance of external resources available to the firm through its networks (Gulati 1999; Hunt and Davis 2008; Zaheer and Bell 2005). Embeddedness of firms in external relationship networks holds significant implications for firm performance (Gulati, Nohria, and Zaheer 2000). Therefore, the relevancy of RBV to supply chain process integration becomes evident because of the engagement of both internal and external resources.

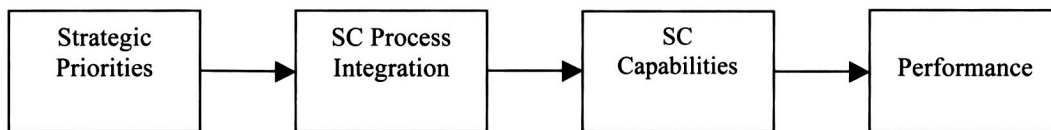
Thus, the combination of SSP and RBV provides a powerful analysis tool. Researchers have concluded that the alignment of strategy and structure is only a baseline requirement for organizational performance (Galbraith and Kazanjian 1986; Miles and Snow 1978). Only when necessary capabilities are developed as a result of the strategy

and structure fit, do firms achieve competitive advantage (Stock, Greis, and Kasarda 1998). Hence, the strategy→structure→capabilities→ performance linkage is well-articulated using the basic tenets of SSP and RBV.

Since resources are the key input factor in the RBV framework; acquiring a unique bundle of resources is critical to a firm’s success. Structure can be viewed as the configuration of a firm’s resources (Hall and Saias 1980). Supply chain process integration, thus, involves restructuring activities used to link and simplify processes to help firms allocate, align, and utilize both internal and external resources. It results in superior performance through the development of relevant capabilities (such as responsiveness and cost reduction ability). These capabilities are widely-acknowledged sources of competitive advantage (Lynch, Keller, and Ozment 2000; Morash, Dröge, and Vickery 1996; Olavarrieta and Ellinger 1997). The general theoretical framework, as shown in Figure 1, is thus proposed as the foundation for more detailed conceptualization.

FIGURE 1

BASIC CONCEPTUAL FRAMEWORK

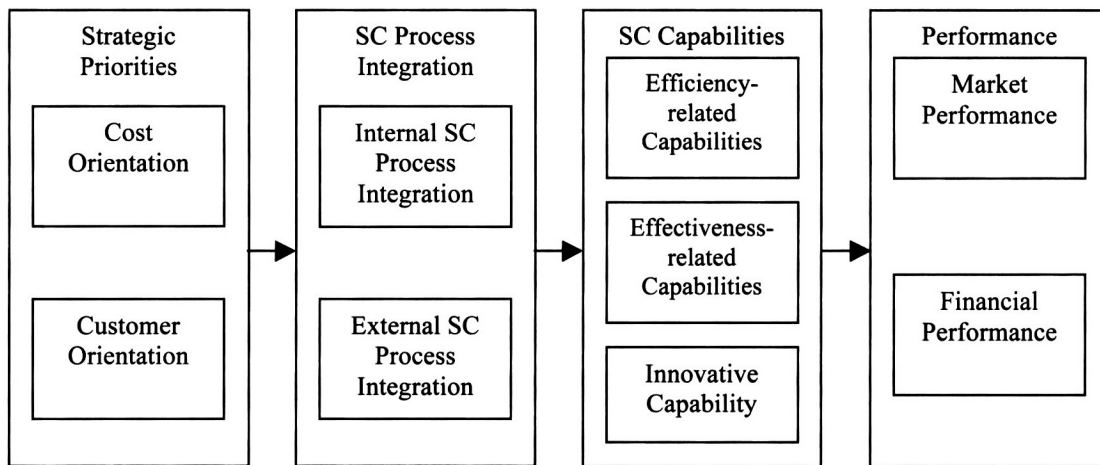


The Detailed Conceptual Model

Due to the emergent nature of themes found in the qualitative study, additional theorizing is needed to assimilate other relevant concepts into the proposed framework. The detailed model is shown in Figure 2, and related propositions are argued based upon complementary theories.

FIGURE 2

DETAILED CONCEPTUAL MODEL



Strategic Priorities and Supply Chain Process Integration

Strategy is a major organizational plan of action to reach a major organizational objective (Higgins and Vincze 1989). Strategy can be inferred through examination of a firm’s strategic priorities. Strategic priority develops from an awareness of opportunities and needs that create new administrative challenges, which may necessitate



refashioned structures to operate the firm efficiently (Chandler 1962; Williamson 1970, 1975). A firm may develop various strategic priorities based on strategy choices such as cost leadership, differentiation, or focus (Porter 1980); however, our study indicates that not all are equally relevant to supply chain process integration. Cost orientation and customer orientation appear to be the most critical strategic priorities that impact supply chain process integration.

Cost orientation and supply chain process integration

Cost orientation is a type of corporate culture that focuses on seeking and exploiting all sources of cost advantage (Parthasarthy and Sethi 1993; Porter 1985). Cost orientation as a significant driver of supply chain process integration is confirmed by our interviews, and supported by trade literature (*Automotive Industries* 2002; Richardson 2005). Firms pursuing a low cost strategy may see integration as a valuable means to achieve cost reduction through business process streamlining and the elimination of redundancies. Transaction Cost Economics (TCE) provides strong support for process integration's impact on supply chain process integration.

TCE offers compelling logic for evaluating the efficacy of exchange in alternative governance structures (Dahlstrom and Nygaard 1999; Poppo and Zenger 1998). Its basic premise is that if adaptation, performance evaluation, and safeguarding costs are absent or low, firms will favor market governance. If these costs are high, enough to exceed the production cost advantages of the market, firms will favor internal organization (Rindfleisch and Heide 1997). While the term "integration" in traditional TCE literature refers to internalization of certain business processes (i.e., ownership of these processes), TCE is also relevant to inter-firm integration (Rindfleisch and Heide 1997). Moreover, SCM clearly emphasizes the system benefits of organizing clusters of transactions (Williamson 2008).

While firms may take either a formal or informal approach to integrating with external partners, such as suppliers, distributors, or third-party logistics providers, linking and simplifying supply chain processes presents an excellent opportunity to reduce both transaction related costs and production costs. The commitment embedded in the long-term close relationships because of specific assets helps prevent opportunism, thus reducing monitoring and control costs related to transactions (Anderson and Weitz 1992; Heide and John 1990). And for supply chain integration it can be argued that the appropriate governance structures across the network should contribute to reducing production costs (see Klein, Frazier, and Roth 1990; Walker and Weber 1984, 1987). Specifically, SCM researchers have suggested external process integration helps reduce production costs through economies of scale, improved asset utilization, substantial inventory savings, and lead time reductions (Maloni and Benton 2000).

Lowering transaction costs have also been argued to explain internal organizational structure (Anderson 1985; Demsetz 1991; Eccles 1985; Masten, Meehan, and Snyder 1991). Firms pursuing a low cost strategy can emphasize coordinating internal business processes with different functional areas working closely (Martin and Grbac 2003). In sum, process integration presents an opportunity for firms to achieve cost advantage because redundancies can be reduced and efficiencies improved (Grant 1991). Hence,

Proposition 1. A firm's cost orientation has a direct positive impact on its supply chain process integration.

Customer orientation and supply chain process integration

Theory also supports that customer orientation has significant impact on supply chain process integration. Customer orientation has been defined as a set of beliefs that puts the customer's interest first and a sufficient understanding of one's target buyers to be able to create superior value for them continuously (Deshpande, Farley, and Webster 1993; Narver and Slater 1990). Although customer often refers to a firm's direct customers in marketing relationship studies, we suggest that it is not sufficient to only accommodate the needs of direct customers. A company should consider all downstream supply chain partners. All customers are integral to the supply chain (Lee 2004).

When customer orientation is a strategic priority, all functional activities and organizational processes need to be organized synergistically and focused toward anticipating and responding to changing market and customer requirements ahead of competitors (Narver and Slater 1990; Webster 1988). Researchers, thus, have argued that the

coordinated integration of the business's resources in creating superior value for customers is tied closely to customer orientation (Narver and Slater 1990; Wind and Robertson 1983). Firms often use cross-functional teams to manage various processes in order to meet customer needs rather than managing each function independently (Cooper, Lambert, and Pagh 1997).

Customer orientation also facilitates external supply chain process integration. First, customer orientation can result in better information visibility. A seller must understand not only the cost and revenue dynamics of its immediate customer, but also the relevant dynamics of the customer's customer (Day and Wensley 1988; Narver and Slater 1990). All efforts should focus on creating and maintaining customer value. Internally, the firms focus on organization-wide development of awareness of and responsiveness to needs of current and potential customers, i.e., a market sensing or market oriented approach (Narver and Slater 1990; Olson, Slater, and Hult 2005). Second, customer orientation fosters collaborative external relationships. With a strong customer orientation, a firm is more likely to develop customer closeness as a distinctive capability (Day 1994). Collaborative relationships can facilitate the connection and simplification of business processes across firm boundaries. An increased commitment to customer orientation should result in increased boundary-spanning activity (Han, Kim, and Srivastava 1998; Pierce and Delbecq 1977). Thus,

Proposition 2. A firm's customer orientation has a direct positive impact on its supply chain process integration.

Combining cost orientation and customer orientation

While a firm's cost orientation and customer orientation each impacts supply chain process integration, we attempt to address an often overlooked gap by arguing that when combined together their impact will be more significant.

Lee (2004) identified pitfalls of supply chains purely focusing on low cost. First, cost-orientation often results in too much inventory at the end of the supply chain because products manufactured purely according to economy of scale often do not sell well. That is one reason why department stores sell as much as a third of their merchandise at discounted prices. Second, firms' obsession with low cost may cause supply chains to break down, with little buffer inventory to use as a cushion. Third and more importantly, low-cost supply chains often become uncompetitive because they cannot adapt to changes in the structure of the market, including unexpected changes in demand or supply. Experience has shown that the lowest cost distributor is not always (in fact, not often) the most successful (Mentzer 1993).

Firms need to apply cost orientation principles and also be customer focused. A widely accepted trade-off in supply chain management is balancing costs and customer service (Cooper and Ellram 1993; Houlihan 1985). While providing a high customer service level is desirable, the cost can be formidable. Thus, a strong cost orientation can help firms keep their supply chain activities within a feasible range.

Collaborative Planning, Forecasting and Replenishment (CPFR) is an excellent example of combining both cost and customer orientation. By integrating sales forecasting and replenishment processes between trading partners, CPFR enables participants to share improvements in both inventory costs and customer service (Esper and Williams 2003). As another example, Walmart's superior supply chain process integration may be the result of emphasis on both cost and customer orientations. On one side, Walmart offers everyday low prices (customer orientation) and on the other side it relentlessly focuses on driving down costs across its supply chain processes. Based on the preceding discussion, the following proposition is offered.

Proposition 3. An effective combination of a high level of cost orientation and a high level of customer orientation can have a stronger impact on a firm's supply chain process integration than does focusing on only one type of orientation.

Supply Chain Process Integration and Supply Chain Capabilities

In the proposed conceptual model, supply chain capabilities are an important link between supply chain process integration and superior performance. According to RBV, creating capabilities is not simply a matter of assembling resources: capabilities involve complex patterns of coordination between people and other resources (Grant 1991). Researchers have linked process and capability. Day (1994, p. 38) stated that “capabilities and organizational processes are closely entwined.” His definition of capability further confirmed the close association between process and capability—“Capabilities are complex bundles of skills and collective learning, exercised through organizational processes, that ensure superior coordination of functional activities” (p. 38). Amit and Schoemaker (1993) also noted that the development of capabilities involves effective management and utilization of organizational processes, because capabilities are embedded in organizational routines and can be achieved through cooperation and coordination (Grant 1991). As a set of restructuring activities, supply chain process integration can help a firm realign processes and resources more effectively, thus contributing to the development of certain critical supply chain capabilities. This is in line with Day’s (1994) argument from a RBV perspective—if a firm is more proficient with its process management than its rivals through process integration, this represents a distinctive capability which can lead to superior profitability.

Social network analysis provides further explanation of why supply chain process integration is critical to capability development. Originating in sociology, social network analysis has emerged as a valuable tool for assessing many types of social structures and has been widely applied in various social sciences (Autry and Griffis 2008). Business scholars have argued that a firm’s network structure and its position in networks have strategic implications to the firm’s capability development and performance (Zaheer and Bell 2005), because resources and capabilities such as access to diverse knowledge (Burt 1992), pooled resources, and cooperation (Uzzi 1996) are often acquired through networks of inter-firm ties. Zaheer and Bell (2005) suggested that firms with superior network structures may be better able to utilize their internal capabilities (so called “network-enabled capabilities”) to enhance their performance.

The extension of social network analysis to SCM seems natural—a supply chain is a network of interconnected organizations (Autry and Griffis 2008; Christopher 2005). Lambert, García-Dastugue, and Croxton (2005) explicitly pointed out that supply chains are not a chain of one-to-one relationships, “but a network of business and relationships” (p. 2). Because of its ability to simultaneously assess multiple structural connections, social network analysis is particularly suited to studying complex supply chain phenomena (Choi, Dooley, and Rungtusanatham 2001; Choi and Krause 2006).

The relationship between process integration and supply chain related capabilities is explored in detail next.

Process integration and efficiency/effectiveness-related capabilities

Considerable effort has been made to identify the dimensions of supply chain capabilities (Morash, Dröge, and Vickery 1996; Zhao, Dröge, and Stank 2001). Most of the supply chain capabilities studied to date fall into two categories: *efficiency-related capabilities* and *effectiveness-related capabilities*. *Efficiency-related capabilities* refer to a firm’s ability to utilize resources (i.e., minimize costs), while *effectiveness-related capabilities* are a firm’s ability to fulfill customer requirements (i.e., enhance customer service) (Mentzer 1993). This categorization parallels Morash, Dröge, and Vickery’s (1996) terminology of supply-management interface capabilities (including channels of distribution, total cost minimization, and lowest cost distribution) and demand-management interface capabilities (including product or service differentiation and service enhancement).

The previous discussion based on TCE suggests that integration as a type of governance structure can contribute to cost reduction. Empirical studies have also shown that integration can help firms develop efficiency-related capabilities. More specifically, process integration can contribute to cost reduction by waste reduction and more effective management of the processes. Maloni and Benton (2000) found that buyer-seller integration can help firms achieve cost savings from the following areas: economies of scale (in ordering, production, and transportation), decreased administration costs, decreased switching costs, and improved asset utilization. Process integration also ensures that operational interfaces within and between firms are synchronized to reduce duplication, redundancy, and dwell time (Rodrigues, Stank, and Lynch 2004), thus helping firms develop efficiency capabilities.

A firm's effectiveness-related capabilities can also be positively impacted by process integration. In order to satisfy customers in a volatile environment, many firms consider prompt reaction to changes as a priority (Daugherty, Stank, and Rogers 1996). Internal process integration can help firms develop effectiveness-related capabilities to respond to the changing customer demands. A firm's responsiveness to customers requires the support of integrated logistics processes (Daugherty, Sabath, and Rogers 1992), because where there is a lack of integration, sub-optimization with inevitable conflict between departments and activities tends to be the norm (Staupe 1987). Zara, a Spanish clothing company, provides an example of how processes integration helps achieve a sustainable competitive advantage by improving responsiveness to customer needs (Heinrich and Simchi-Levi 2005).

Similarly, external process integration can also contribute to the development of a firm's effectiveness-related capabilities. According to Bagchi and Skjoett-Larsen (2002), supply chain integration encourages partners to become more entrenched members of the supply chain by instilling a sense of belonging. The enhanced trust and commitment among supply chain members enable them to work closely to address changes in the market. In fact, TCE researchers have argued that effective governance structures, such as supply chain process integration, greatly enhance firms' ability to adapt to environmental uncertainties (Rindfleisch and Heide 1997). One good example is the process integration with third party logistics providers (3PL). Logistics resources and expertise are core competencies of 3PL's, but not for many manufacturers, technology companies, and retailers (Boyson, Corsi, and Rabinovich 1999). Integrating with 3PL's allows firms to better respond to changing customer needs and market trends. In addition, through both internal and external process integration, firms are able to quickly draw inputs and skill sets from various functional areas.

Proposition 4a. A firm's supply chain process integration has a positive impact on its efficiency-related capabilities.

Proposition 4b. A firm's supply chain process integration has a positive impact on its effectiveness-related capabilities.

Process integration and supply chain related innovative capability

In addition to the above discussed efficiency/effectiveness-related capabilities, we also want to emphasize that supply chain process integration impacts another type of important but often overlooked supply chain capability—innovative capability. Innovation has been defined as the generation, acceptance, and implementation of new ideas, processes, products, or services (Amabile et al. 1996; Thompson 1965). Although innovation may be defined very broadly, including technology, product, services, processes, or any social system (Flint et al. 2005), the research on innovation has largely focused on new product-related breakthroughs (Han, Kim, and Srivastava 1998). As services become a more important differentiator (Christopher 2005), service innovation has gained attention (Berry et al. 2006). However, service innovation in the supply chain context has received little research attention (Flint et al. 2005). Similar to Richey, Genchev, and Daugherty's (2005) stance, innovation is considered a firm capability—the ability to innovate. Thus, the emphasis here is *supply chain innovative capability*, which is defined as a firm's ability to develop and offer new services or processes to create superior value for supply chain members.

Process integration's impact on supply chain innovative capability can be argued from a social network theory perspective, which emphasizes that a superior network position enables a firm to develop strong innovative capability (Zaheer and Bell 2005). When well managed, both internal and external network ties provide superior access to information and knowledge that are needed to be innovative (Autry and Griffis 2008; Burt 1992, 2000; Zaheer and Bell 2005). Internal process integration helps a firm develop a tight and effective internal network, which can positively influence the firm's innovative capability (Chandy and Tellis 1998). A firm's position in its external networks may also be optimized through external process integration, which will facilitate the access to available external knowledge through the interactions (Nahapiet and Ghoshal 1998). This is consistent with RBV's premise—effective utilization of resources can contribute to distinctive capabilities (Zaheer and Bell 2005).

Existing innovation literature has supported both internal and external process integration's impacts on product innovation (Kahn 1996; Frohlich and Westbrook 2001; Stank, Daugherty, and Ellinger 1999). Here we also argue that process integration can significantly contribute to a firm's supply chain innovative capability, which emphasizes new processes and services. Argyris (1982) suggested that organizational participants typically face uncertainty in dealing with innovations, coupled with the absence of pre-established rules or procedures. In such situations, process

integration helps mitigate distrust and conflicts among the functional units, which in turn provides an environment more receptive to innovations (Han, Kim, and Srivastava 1998). An interfunctional relationship that fosters trust and dependence can help a firm in creating innovative business processes and services through interfunctional coordination (Gupta, Raj, and Wilemon 1986; Ruekert and Walker 1987). Furthermore, through close interactions between different parties, process integration requires a firm to develop a thorough understanding of the operations along the supply chain, which provides a solid knowledge foundation for developing supply chain innovative capability. Also, as social network analysis suggests, process integration enables cross-fertilization and stimulation of ideas through shared knowledge and experiences among different functional areas and partnering firms (Flint et al. 2005). Therefore, a strong supply chain related innovative capability is more likely to be developed through process integration.

Proposition 5. A firm's supply chain process integration has positive impact on its supply chain related innovative capability.

Supply Chain Capabilities and Performance

Researchers have argued that supply chain capabilities can become distinctive and represent a powerful source of competitive advantage due to the unique boundary-spanning nature (Bowersox and Closs 1996; Olavarrieta and Ellinger 1997). The RBV framework suggests that by developing distinctive capabilities a firm can establish a competitive advantage, which is reflected in its performance (Barney 1991). *Performance* in general is the extent to which a firm's goals are achieved (Ellinger, Daugherty, and Keller 2000). The focus here is to examine a firm's overall performance in terms of market performance and financial performance, which indicate the firm's success level. A firm's market performance includes both market share and customer satisfaction. While market share is a good indicator of the firm's competitiveness in the marketplace, customer satisfaction reflects customers' value perception. A firm's success in the marketplace rests on the firm's ability to attract, satisfy, and retain customers by creating customer value (Johnson 1998). Economic theories suggest that achieving economic rents is the goal of any firm (Lado, Boyd, and Hanlon 1997). Thus, measures such as profitability, sales volume, return on asset (ROA), etc. should be used to evaluate a firm's financial performance.

When a firm develops distinctive supply chain capabilities through supply chain process integration, it is likely to achieve competitive advantage in the market (Day 1994; Olavarrieta and Ellinger 1997), and result in bigger market share. Efficiency-related capabilities focus on cost reduction, which in turn directly contributes to better financial performance. Effectiveness-related capabilities such as availability, timeliness, and quality centers on customers and thus can positively impact customers' value perception. Customer satisfaction can also result when efficiency capabilities can be converted into lower cost for customers. Satisfying customers through value creation helps a firm's bottom line (Cannon and Homburg 2001; Reichheld and Sasser 1990). The link between supply chain capabilities and firm performance has been supported by numerous studies (Sinkovics and Roath 2004; Zhao, Dröge, and Stank 2001).

In addition to widely studied efficiency/effectiveness-related capabilities, a firm's supply chain innovative capability can also significantly contribute to organizational performance improvement (Han, Kim, and Srivastava 1998). RBV (Wernerfelt 1984) helps to explain how firms derive competitive advantage by channeling resources into the development of new products, processes, and so forth. As market environments changes, firms must adopt innovations over time and the most important innovations are those allowing the firm to achieve some sort of competitive advantage, thereby contributing to performance (Hult, Hurley, and Knight 2004). Innovative capability rooted in process integration involves complex development procedures and knowledge contributions from various parties within and outside a firm, making it a superior distinctive capability. Das and Joshi (2007) found a significant and positive relationship between a firm's innovativeness and its financial performance. Therefore, it can be proposed that

Proposition 6a. A firm's efficiency-related capabilities have a positive impact on its performance.

Proposition 6b. A firm's effectiveness-related capabilities have a positive impact on its performance.

Proposition 6c. A firm's innovative capabilities have a positive impact on its performance.

IMPLICATIONS

The current study makes a number of contributions by introducing a conceptual model of supply chain process integration emphasizing a process view and an internal-external perspective. The proposed model brings disparate research streams and concepts together to further the understanding of supply chain process integration, thus having important implications to both researchers and practitioners.

Theoretical Implications

As an important first step, the current study attempts to provide directions for future research on supply chain process integration through the proposed conceptual model, incorporating critical concepts. While we acknowledge that some terms are generic in nature, the conceptual model offers a helpful framework for further investigation on supply chain process integration. Future studies could identify more specific concepts relevant to the framework. Also, empirical tests are warranted to validate or modify the conceptual model. Although testing the entire model in one study may be a formidable task, continuing efforts should be taken to test groups of the links.

This study also addresses an important research gap by identifying and utilizing four theoretical frameworks. Integration research to date lacks strong theoretical basis, which may inhibit in-depth understanding of this complex phenomenon. Through drawing upon four different theoretical frameworks—SSP, RBV, TCE, and social network analysis, our study offers fresh new angles to study supply chain process integration. A single theory may have very limited explanatory power. Instead, combining the tenets from multiple theories can generate a thorough understanding and a more complete scheme. We limit our discussion to the four most relevant theories to maintain focus in the current study. However, we acknowledge and welcome the possibility of utilizing other theories in integration research.

Another important research gap addressed in the current study is the lack of research on the antecedents of integration (Pagell 2004). Our study is among the first to propose that a firm's strategic priorities are crucial antecedents of supply chain process integration. Two types of strategic priorities—cost orientation and customer orientation—are identified as the key drivers based on industry interviews and trade literature review. More importantly, we argue that the interaction of these two strategic orientations has a stronger combined effect on supply chain process integration. Besides the identified strategic priorities in the model, future research may explore the effects of other potential drivers of supply chain process integration.

Last but not least, the majority of previous studies have suggested the direct positive link between supply chain integration and performance. However, the current study argues that supply chain process integration enhances firm performance through the development of necessary supply chain capabilities. Special attention was paid to the often overlooked capability of supply chain innovation. In today's intense competitive environment, the ability to offer innovative services and processes becomes increasingly important.

Managerial Implications

Supply chain managers can benefit from the current study in various ways. First, developing appropriate strategic priorities is critical to the successful implementation of supply chain process integration. The results from the industry interviews suggest that cost orientation and customer orientation drive adoption of the integration concept. Very few companies identified both factors simultaneously. However, our study indicates that neglecting either one may lead to suboptimal outcomes.

Second, although the importance of customer orientation has long been advocated, many non-marketing managers still believe that it is strictly the marketing manager's responsibility to really care about customers. Many managers in other areas still view customer orientation as a remote and irrelevant concept. Even firms that aspire to become customer oriented oftentimes find it is difficult to implement because they underestimate how challenging it is to shift an organization's focus to both internal and external concerns (Day 1994). However, the proposed conceptual model suggests that the implementation of supply chain process integration, encompassing various functional areas within and across firms, requires the incorporation of customer orientation at every step. Only when customer orientation is instilled and sustained can supply chain process integration create value for customers and yield the desired financial outcomes for the firm.

Third, the proposed conceptual model suggests that internal process integration and external process integration should be differentiated, but managed cohesively. Although supply chain process integration involves both, it is not wise to treat them with a single approach. For example, although information exchange is widely recognized as a key factor that facilitates process integration, information sharing within a firm and across firm boundaries can differ significantly. Even with close partners, actions need to be taken to protect proprietary information.

CONCLUSION

Supply chain integration is a formidable task. Research on integration of the supply chain is almost as formidable as the tasks involved in integrating the actual supply chain. Our research makes a contribution by identifying the key components that should be considered. Researchers are encouraged to take the next steps by testing our propositions and extending those propositions through the introduction of additional constructs.

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1 “Logistics and Supply Chain Management Applications within a Global Context: An Overview”

Tobias Schoenherr

This paper reviews 726 academic research studies covering logistics and supply chain management (L&SCM) applications within a global context. Articles are analyzed according to their publication year and outlet, common themes, and countries or regions investigated. The sample was drawn from the ABI/INFORM Global database, which includes almost 1,800 journal titles. The review offers a starting point for researchers, graduate students, faculty members or practitioners examining international L&SCM applications. The article also draws attention to the wide array of global L&SCM studies conducted, their settings and viewpoints. Additionally, this paper highlights some of the most interesting works and draws attention to lesser-researched countries and regions of the world. The overview also provides an introduction for practitioners and managers to what academic research has covered in the area of global L&SCM. Practitioners can use this review as a starting point for the identification of relevant and useful references for their particular task.

Key Words: Global context; Literature review; Logistics; Supply chain management

27 “Supply Chain Process Integration: A Theoretical Framework”

Haozhe Chen, Patricia J. Daugherty, and Timothy D. Landry

The current study was undertaken to further understanding of supply chain process integration. It is suggested that supply chain integration, the practice of realigning firms' operating structures, should be understood from an internal-external perspective and a process view. Drawing upon four theories—Strategy-Structure-Performance framework, the resource based view of the firm, transaction cost economics, and social network analysis—and combining industry inputs, a theoretical framework of supply chain process integration is developed. It is argued that a firm's strategic priorities are key factors of supply chain process integration. Superior performance is likely to be achieved when necessary supply chain capabilities are developed through supply chain process integration.

Key Words: Resource based view; Social network analysis; Strategic priorities; Strategy-structure-performance framework; Supply chain capabilities; Supply chain process integration; Transaction cost economics

47 “Managing Change in Supply Chains: A Process Comparison”

Bertie M. Greer and Matthew W. Ford

The coordination required to successfully implement supply chain initiatives suggest that supply chain management change processes may possess some unique characteristics. Yet, empirical studies are scarce to support this logic. Using an empirical design and data obtained from managers, and drawing largely from Lewin's change process conceptualization, this study compares the process of supply chain management change to non-supply chain management change. Further investigation into monitoring and control of supply chain management change is advised.

Key Words: Change management; Planned change; Supply chain management