

What is Management in Supply Chain Management? - A Critical Review of Definitions, Frameworks and Terminology

Dag Naslund
University of North Florida and Lund University, Sweden

Steven Williamson
University of North Florida

Supply Chain Management (SCM) is a concept that is gaining in popularity and importance. However, SCM is not a concept without problems. These problems include the lack of a universally accepted definition of SCM, the existence of several different and competing frameworks for SCM, issues with terminology and the relative lack of empirical evidence supporting the benefits attributed to SCM. The purpose for this paper is therefor to bring some clarification to the concept of SCM by exploring some of the more prevalent SCM definitions, frameworks and terminology.

INTRODUCTION

Supply Chain Management (SCM) is a concept that is gaining in popularity and importance. From a practitioner point of view, an Accenture report (in co-operation with Stanford and Insead) states that SCM is critically important or very important to 89% of the surveyed executives. Furthermore, SCM is increasing in importance as 51% of the executives stated that their investments in SCM have increased significantly over the last three years (Accenture 2010). SCM has also been frequently discussed and researched by practitioners and academics over the last two decades. Stock and Boyer (2009) describe how the number of SCM articles continues to grow on a yearly basis after the “rapid surge” that started in the middle of the 1990s. Additionally, the number of academic dissertations dealing with SCM-related topics has steadily increased since the early 1990s (Ibid.).

One reason for the increased interest in SCM is that organizations progressively find themselves reliant upon having effective supply chains, or networks, to successfully compete in the global market economy (Lambert 2008). In the competitive global environment, performance can no longer solely be determined by the decisions and actions that occur within a firm as the execution of all members involved contributes to the overall results of the supply chain. Similarly, Wen et al. (2007) mean that competition has changed from being between individual enterprises to increasingly being between supply chains. As organizations form global alliances, it is imperative that they understand how SCM can be successfully applied (Halldorsson et al. 2008); especially as organizations face challenges including mitigating risks and disruptions in the supply chain (Neureuther, 2009). For these reasons, there is a need for companies to manage not only their own organizations but also their relationships with other companies in the same supply chain (Croxtton et al. 2001; Stock et al. 2010).

Naturally, another reason for the increased interest is the potential benefits of SCM. Benefits include improvement in returns on investments (ROI) and returns on assets (ROA). “Ultimately, the goal of SCM is to achieve greater profitability by adding value and creating efficiencies, thereby increasing customer satisfaction” (Stock and Boyer 2009, p.703). Ideally, improvement of the supply chain translates to

benefits for all supply chain members. Costs decrease as a result of reduced redundancies, lower inventory levels, shorter lead time and lessened demand uncertainties. Improved process performance result in enhanced product quality, customer service, market responsiveness, and target market access (Fisher 1997; Lambert et al. 2005; Lee et al. 1997; McCarthy and Golicic 2002; Sabath and Fontanella 2002; Stank et al. 2001; Tan et al. 2002; Tummala et al. 2006). Performance is thus improved through better use of internal and external capabilities creating a seamlessly coordinated supply chain, elevating inter-company competition to inter-supply chain competition (Burgess et al. 2006; Lummus and Vokurka 1998; Mentzer 2004; Lambert 2008).

Problems

However, the concept of supply chain management is not without problems. One major problem is the relative lack of empirical evidence supporting the benefits attributed to supply chain management (Lambert et al. 2005 Stock et al. 2010). Similarly, most of the research concerning supply networks in operational in nature and has been based on case examples of focal companies such as Benetton, Toyota and Nissan (Jarillo and Stevenson 1991). Lamming et al. (2000) pointed out that a problem is that these studies concentrated on a particular industry, typically the automotive industry. Thus, managers in other industries lack theoretical foundation for managing their particular businesses since networks vary not only between industries but along range of other aspects. Likewise, most of the research related to strategic relationships is dyadic in nature. It describes primarily how two companies can improve their relationships, but it seldom includes an actual supply chain (Stock et al. 2010).

Another major problem for SCM is the lack of a universally accepted definition of SCM. The apparent lack of empirical research supporting benefits of SCM is, unfortunately, logical when a generally accepted definition does not exist. Burgess et al. (2006) analyzed 100 randomly selected SCM articles and found that 12 articles posited unique definitions, 21 referred to existing definitions, 9 used slightly modified versions of existing definitions, and 58 left SCM undefined. The problem with lack of a universally accepted definition has been highlighted during the last decade by some of the leading scholars in the field. Mentzer et al. (2001) discussed the issue already in 2001. In 2005 Lambert et al. stated that SCM has been frequently used as a synonym for logistics, operations management or purchasing or a combination of the three. Even when people consider SCM as a value adding flow from material to product, it can be viewed as a flow within a firm or from raw material to end consumer. Lambert et al. (ibid, p.25) finally mention that to some SCM is seen as *“the management of relationships both between corporate functions and across companies”*.

In their recent paper, Stock and Boyer (2009) reviewed 173 definitions of SCM across a multiplicity of journals and books. They not only argue that too many definitions exist, but also that the lack of a single definition has significant negative impact for both practitioners and researchers. They write (ibid, p. 691.): *“Without an inclusive or encompassing definition, it will be difficult for researchers to develop supply chain theory, define and test relationships between components of SCM, and develop a consistent stream of research that “builds” on what has gone before...Without the adoption of a uniform definition accepted by researchers, confusion will continue to hinder the study and further development of SCM; and research will extend in various directions, rather than build upon itself (i.e. creating synergy in research). For practitioners, the absence of a comprehensive SCM definition makes it more difficult for supply chain executives to claim authority and responsibility for the “right” combination of functions and processes. It also makes it more difficult to benchmark against other companies and industries on supply chain metrics, job responsibilities, and other human resource issues, because of the differences that exist from one company to the next.”*

Similarly, several different and somewhat competing frameworks for SCM exist. Yet despite the existence of these frameworks, the field lacks a commonly accepted framework. There is also little consensus regarding how supply chain management actually should be implemented and measured (e.g., Lambert et al. 1998; Bowersox et al. 1999; Mentzer 2004). Lockamy and McCormack (2004), for example, argue that supply chain management is more difficult to operationalize in practice than some academics or consultants seem to claim.

In addition, a multitude of popular terms are connected to SCM. However, one could also argue that these popular SCM terms – such as collaboration and integration - are poorly defined in the context of SCM. Even so, the academic community is embracing new concepts, for example sustainable supply

chain management (SSCM). Yet, without proper definitions of these terms in a SCM context, the field will continue to be confusing for both researchers and practitioners. Stock and Boyer (2009, p.691) wrote: *From a theoretical perspective, it is impossible to develop sound SCM theory until valid constructs and generally accepted definitions of terms are developed.*"

The purpose for this paper is to bring some clarification to the concept of SCM by exploring some of the more prevalent SCM definitions, frameworks and terminology. In the following sections we first review SCM definitions followed by an evaluation of SCM frameworks. We proceed to a critical examination of the terms collaboration, integration, and sustainability as they have been applied to SCM. We then debate commonalities and problems based on the review before providing a concluding discussion.

SCM DEFINITIONS

The first SCM definition in our review is provided by the Council of Supply Chain Management Professionals (CSCMP). CSCMP refers to itself as the preeminent worldwide professional association of supply chain management professionals with a vision to *"lead the evolving supply chain management profession by developing, advancing, and disseminating supply chain knowledge and research"*. CMCSF defines SCM as *"encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies"* (www.cscmp.org). However, CSCMP also state the supply chain management (SCM) profession has continued to change and evolve to fit the needs of the growing global supply chain. With the supply chain covering a broad range of disciplines, the definition of what is a supply chain can be unclear. Often times SCM can be confused with the term logistics management.

The second definition is provided by the Global Supply Chain Forum (GSCF). GSCF state that they provide the opportunity for leading practitioners and academics to pursue the critical issues related to customer satisfaction and operational excellence independent of specific functional expertise. GSCF consists of 15 member companies and it is hosted by the Fisher College of Business at the Ohio State University. GSCF defines SCM as: *"Supply Chain Management is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders."* (Lambert et al, 1998, p.1). On the forum website, they also write: *"Supply Chain Management is not a business function, rather it is a new business model necessary for an organization's success and everyone in the organization needs to be involved"* (www.scm-institute.org). However, implementation of this definition into the practice represents a difficult and challenging task as there is a significant degree of complexity related to management of all tiers of suppliers back to the point of origin and all tiers of customers out to the point of consumption (Lambert et al, 1998).

Our final definition is provided by Stock and Boyer (2009). Their definition is based on a synthesis of a wide range of suggestions provided by a variety of practitioner, academic and hybrid sources. They deconstructed the commonalities in all the reviewed suggestions in order to develop their definition of SCM as: *"The management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing, and related systems that facilitate the forward and reverse flow of materials, services, finances and information from the original producer to final customer with the benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction"* (Stock and Boyer 2009, p.706).

To some extent, the SCM definitions seem to indicate a move away from the chain analogy to a network analogy. Hertz (2001) also discusses Supply Chain Networks as *"the network that supplies a specific product or product group following the chain from raw material to the final consumer"*. Lambert et al. (2005, p.25) write that *"Given that a supply chain is a network of companies, or independent business units, from original supplier to end-customers, management of this network is a broad and challenging task"*. Thus supply networks comprise of both "upstream" network of suppliers and

“downstream” network of distributors and customers. Similarly to supply chains, networks encompass several dimensions of physical, payment and information flows and also other dimensions such as social, technological, legal and administrative ones.

SCM FRAMEWORKS

SCM frameworks should serve as a point of reference for researchers and managers. In our review, we include four frameworks: the Supply Chain Operations Reference (SCOR) model, the Global Supply Chain Forum (GSCF) framework, the Collaborative Planning, Forecasting, and Replenishment (CPFR) tool and a framework developed by Mentzer et al. (2001). In a previous article, Lambert et al. (2005) reviewed five SCM frameworks. In our review, we include three of the same frameworks, although we do expand our discussion of one of them (the Mentzer framework). We also exclude two frameworks due to lack of significant detailed level description (frameworks by Srivastava et al. 1999 and by Bowersox et al. 1999). On the other hand, we added one more framework/tool - the Collaborative Planning, Forecasting, and Replenishment (CPFR) tool. In the following sections we describe each of the four frameworks.

Supply Chain Operations Reference (SCOR)

The Supply Chain Operations Reference (SCOR) model, developed by the Supply Chain Council (SCC) and AMR Research in 1996 is the most commonly cited SCM framework (Lochamy and McCormack 2004). SCC describes itself as “*an independent, not-for-profit, global corporation with membership open to all companies and organizations interested in applying and advancing the state-of-the-art in supply chain management systems and practices. The SCOR-model captures the Council’s consensus view of supply chain management.*” (www.supply-chain.org).

The SCOR model “*provides a unique framework that links business processes, metrics, best practices and technology features into a unified structure to support communication among supply chain partners and to improve the effectiveness of supply chain management and related supply chain improvement activities*” (Supply Chain Council, 2009). According to the SCC, SCOR is used to identify, measure, reorganize and improve supply chain processes through a cyclical process that includes:

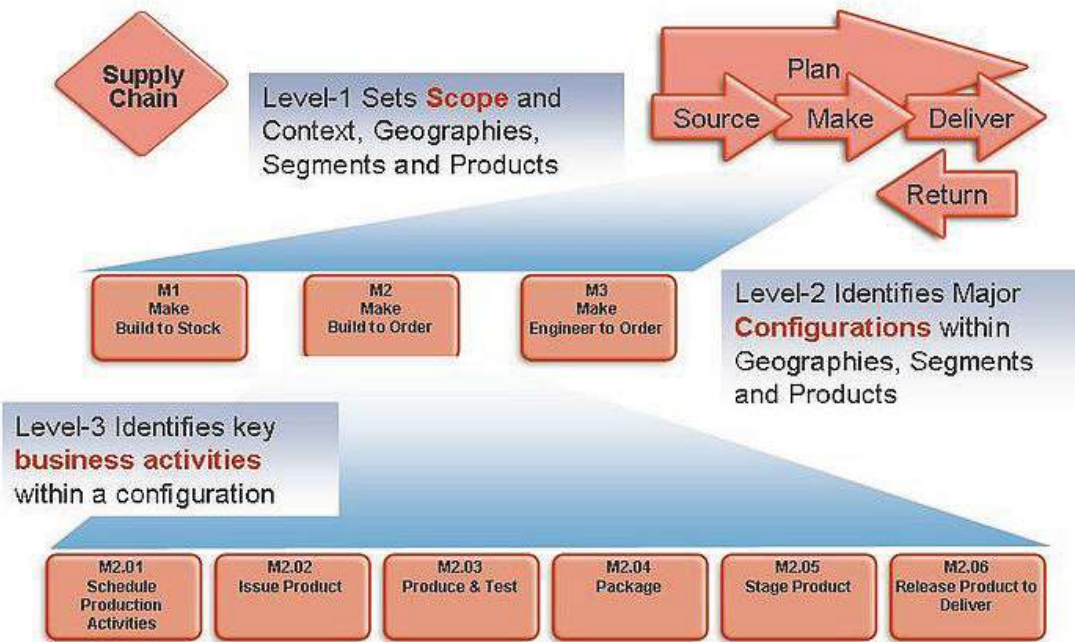
1. Capturing the configuration of a supply chain
2. Measuring the performance of the supply chain and comparing against internal and external industry goals
3. Re-aligning supply chain processes and best practices to fulfill unachieved or changing business objectives

Through the completion of the steps outlined above, the SCOR model aims to integrate well-known concepts such as business process reengineering, benchmarking, and process measurement into a cross-functional framework (Huan et al. 2004). When originally developed in 1996, four core business processes – plan, source, make, and deliver – served as the foundation of the SCOR model. Later, in 2001, a fifth process – return – was added to enhance the validity of the model. Each of these processes is implemented through four individual levels. The first level defines the scope and content of the model itself, as well as specifying basis for competition performance targets. At level two, companies implement their operations strategies dependent upon the configurations they choose for their supply chains. Level three defines inputs, outputs, and flows of each transactional element, and finally, level four defines the implementation of specific supply chain management practices (Lochamy and McCormack 2004). The source, make, and deliver processes of the SCOR model create a continuous chain of activity throughout a company’s internal operations and, potentially, across the whole inter-organizational supply chain. One also could argue that the framework includes a high level planning process, which balances aggregate demand and supply to develop a course of action that best meets the requirements of the source, make, and deliver processes (Lambert et al. 2005).

FIGURE 1
THE SCOR MODEL

SCOR Framework Levels

SCOR®
Supply Chain Council

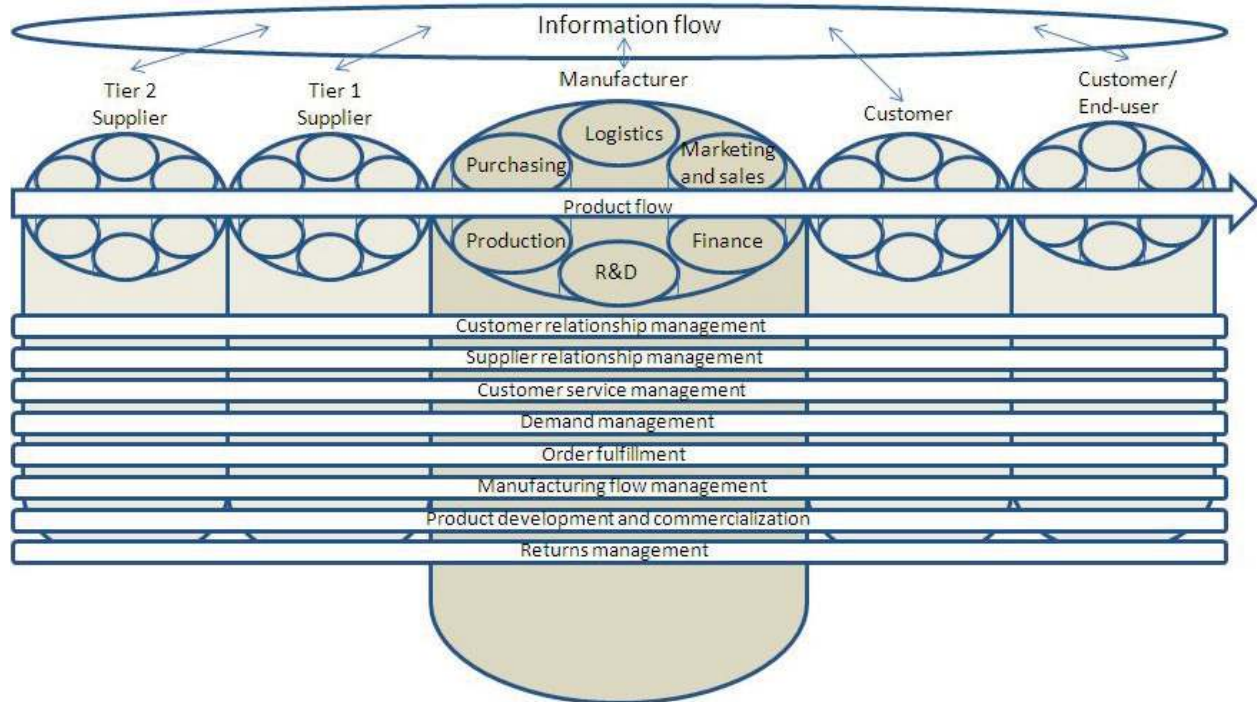


Global Supply Chain Forum Framework

The second most popular framework is developed by the Global Supply Chain Forum (GSCF) (Lambert et al. 1998). The GSCF framework identifies eight key processes that form the foundation for supply chain management (see Figure 2 based on Lambert 2008). Common definition and shared understanding of processes is thus of significant importance (Croxtton et al. 2001). The eight key business processes are; *Customer Relationship Management*, *Customer Service Management*, *Demand Management*, *Order Fulfillment*, *Manufacturing Flow Management*, *Supplier Relationship Management*, *Product Development and Commercialization* and *Return Management* (Cooper et al. 1997). Each process runs cross-functionally, cutting through functional silos within each organization (Croxtton et al. 2001). Functional silos are defined, for example, as marketing, research and development, finance, production, purchasing, and logistics. Each process is furthermore broken down into a series of strategic sub-processes, thus providing the blueprint for implementation of the framework (Lambert et al. 2005).

Of the eight processes, customer relationship management and supplier relationship management provide a crucial link to external companies within the chain. Although the processes should be considered by all companies in each supply chain, the significance of each process may differ (Croxtton et al. 2001). Some companies may need to link just one key process while for other companies it is appropriate to link multiple processes. It is thus crucial to analyze which key processes to integrate and manage in each specific case (Cooper et al. 1997).

FIGURE 2
THE GLOBAL SUPPLY CHAIN FORUM MODEL



The GSCF framework stresses the importance of utilizing a process focus, where all functions that touch a product or are involved in its service delivery must work together. Therefore, it also is paramount that close relationships be continually developed and maintained with key customers and suppliers. For this purpose, the GSCF has also developed a partnership model, helping companies to structure fundamental relationships that are identified when implementing the customer relationship management and supplier relationship management processes (Lambert 2008). According to the GSCF framework, when all proper coordination mechanisms are in place across the various functions, the result will be an efficient and effective supply chain.

Collaborative Planning, Forecasting, and Replenishment

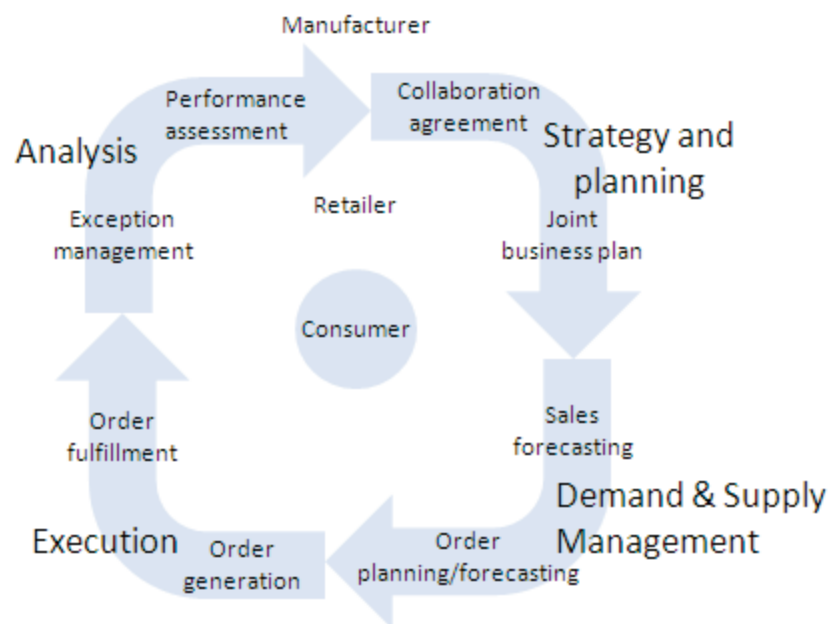
Another framework, or rather a conceptual tool, is the Collaborative Planning, Forecasting, and Replenishment (CPFR) method. CPFR is described as a web-based format created to coordinate various activities between supply chain trading partners, such as production and purchase planning, demand forecasting, and inventory replenishment. In 1998 the Voluntary Inter-Industry Commerce Standards Association (VICS) established a committee to identify best practices and create design guidelines to be applied to CPFR. With these practices and guidelines in place, several companies have participated in the validation and testing of CPFR. As a result of these efforts, CPFR is the third most used methodology for improved supply chain collaboration (Attran and Attran 2007). The objective of CPFR is to exchange selected internal information over a shared web server in order to provide more reliable and long term views of demand within the supply chain (Flidner 2003). Enhanced planning visibility in the supply chain includes potential benefits - such sales increases, inventory reductions, and improved customer service - to both retailers and manufacturers (Cassivi 2006).

To some extent CPFR is more focused on information technologies than the process-oriented SCOR and GSCF frameworks. Another noteworthy distinction between CPFR and earlier supply chain collaboration models is that CPFR does not require a critical mass of users to function, but enables a company to improve performance by having one single collaborative relationship with a supply chain

partner. This distinction, along with the involvement and support of VICS, facilitated an increase in the number of companies willing to test CPFR.

The CPFR process is divided into stages. The first step, planning, involves a front-end agreement and the development of a joint business plan between supplier and customer. Step two, forecasting of demand and supply, involves the creation of sales and order forecasts. In the execution stage, the order is generated and the products are shipped, received and stocked on retail shelves. In the final step, analysis, trading partners can come together to share insights and adjust strategies to improve planning and execution performance going forward (Cassivi 2006; Attran and Attran 2007). In CPFR, a sound planning phase is essential - it is here where supply chain partners develop collaboration initiatives and as well as the terms of their agreement with one another. The remaining phases are more operational in nature and build upon the principles set forth in the planning phase. It is essential to emphasize that CPFR is not viewed as a technical standard and that the CPFR process is not fundamentally dependent on technology, although technology certainly is emphasized. Rather, CPFR makes use of common tools and processes to improve supply chain planning through improved information flow.

**FIGURE 3
THE CPFR MODEL**



The Mentzer Framework

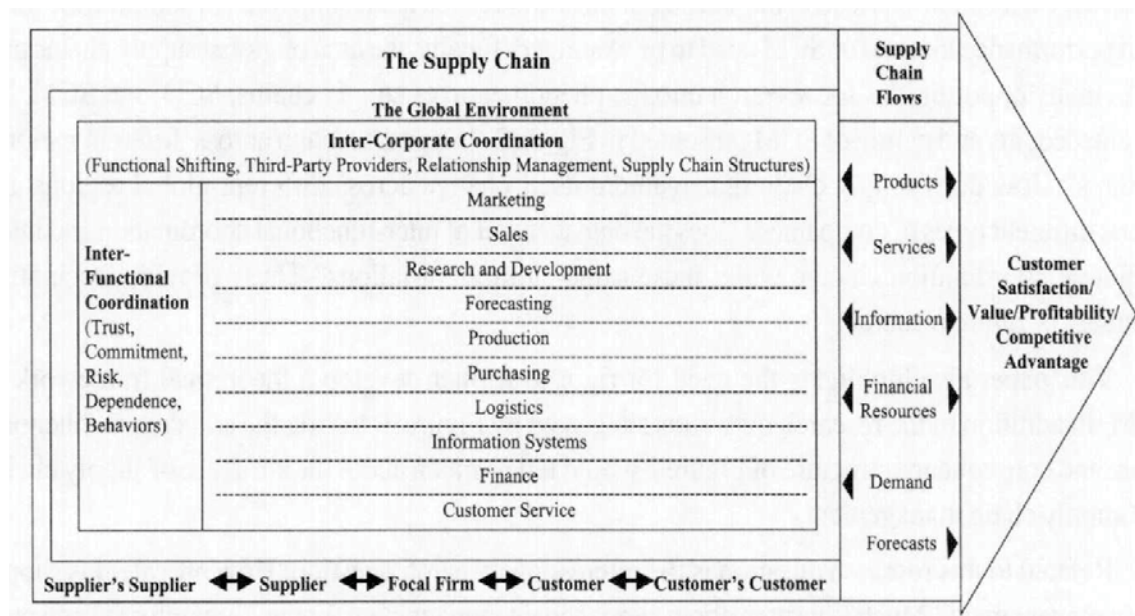
The fourth framework in our review was developed by Mentzer et al. (2001) in order to establish a consistent means for conceptualizing supply chain management. Mentzer and his colleagues defined supply chain management in this analysis as “the systematic, strategic coordination of the traditional business functions and tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long term performance of the individual companies and the supply chain as a whole.” The authors’ description of SCM was built on an extensive literature review of traits that characterize supply chain management. According to this definition, SCM involves multiple firms and multiple business activities, as well as process orientation to coordinate activities across functions and across firms within the supply chain. This definition led to the development of a conceptual supply chain management model as pictured in Figure 4 below.

In this framework, the supply chain is presented as a pipeline, illustrating the supply chain flows, the inter-functional coordination of traditional business functions, and the inter-corporate coordination between supply chain partners from the supplier’s suppliers through the customer’s customer to

ultimately provide value and satisfaction for the consumer. Customer value and satisfaction is recognized by Mentzer and his colleagues to be a necessary factor to achieve competitive advantage and profitability for both individual companies in the supply chain as well as the supply chain as a whole (Mentzer et al. 2001).

Three of the frameworks described above, SCOR, GSCF and CPFR, are sufficiently defined and could potentially be implemented by a variety of organizations. The GSCF framework is broad in scope. The large span could create implementation challenges, especially as it also recommends that organizations shift from functional orientation to processes orientation/management. The SCOR framework may be easier to implement as it only involves the business functions of sourcing, manufacturing, and logistics, yet it also may create sub-optimization to manage a supply chain without input from the other functions (Lambert et al. 2005). The CPFR framework is smaller in scope, leaving it up to each company to decide how many collaborative relationships it wants to implement during a given time. The ease of implementing CPFR and the fact that improvements can be measured from just one collaborative relationship are the framework's greatest strengths. However, unlike the other two frameworks, CPFR does not assure that internal resources are aligned which can be construed as a weakness. While the Mentzer framework focuses on cross-functional interaction within a firm and on the relationships developed with other supply chain components, the processes that need to be implemented are not described.

**FIGURE 4
THE MENTZER MODEL**



SCM TERMINOLOGY: COLLABORATION, INTEGRATION AND SUSTAINABILITY

Several key concepts can be drawn from a thorough review of SCM literature in general as well as from the SCM definitions and the SCM frameworks. In addition to the obvious coordination of flows and activities, the definitions and frameworks use terms such as collaboration and integration. Additionally, sustainability has continued to garner a steady level of attention in recent years. In the following sections, we attempt to dissect these terms while focusing on the content and meaning of each.

Supply Chain Collaboration

According to Angerhofer and Angelides (2006), the objective of a collaborative supply chain is to gain competitive advantage by improving the chain's overall performance through a holistic approach, rather than by improving each link independently. The belief is that increased collaboration will lead to a

seamless, synchronized supply chain, which in turn will lead to improved customer service, lower costs, and higher profits (Holweg et al. 2005). Other potential benefits of supply chain collaboration include improved flexibility, better utilization of resources, shortened as well as improved control of delays, and increased quality and development of competency, each of which will lead to lower costs and higher profits (Gruat La Forme et al. 2007). A more general benefit of increased collaboration is the positive effect that supply chain collaboration has on key performance indicators, thus leading to increased profits (Angerhofer and Angelides 2006). Supply chain collaboration has emerged as one of several phrases used to describe efforts for creating long-term competitiveness. Since the mid-1990s, supply chain collaboration has been advocated by consultants and academics in forms of Vendor Managed Inventory (VMI), Collaborative Planning Forecasting and Replenishment (CPFR), and Continuous Replenishment (CR).

However, supply chain collaboration is still a poorly defined term that can include anything from increased information exchange on the operative level between two companies to shared forecasting to joint decision making (Ajmera and Cook 2009). In its more advanced form, collaboration can include the formation of partnerships and, according to Gruat La Forme et al. (2007), companies in the supply chain that are actively working together by sharing information, knowledge, risk, and profits toward a common goal. In order to structure the term, one could argue that forms of collaboration can exist on at least three different levels between organizations in the supply chain: at the operational, tactical, and strategic levels.

At the operational level, examples of collaboration include collaboration on daily, routine type, transactional activities. At the tactical level, collaboration involves activities to control and coordinate the flow of goods as well as various information flows. Collaboration at this level can lead to reduced uncertainty by creating a transparent, visible demand pattern upstream in the supply chain (Holweg et al. 2005). Relevant and reliable information available on the demand side can lower supply chain risks and simplify management and control of supplier processes (Frohlich and Westbrook 2001). Finally, and perhaps somewhat unrealistically, the strategic level would involve activities to influence future direction of the supply chain in a collaborative manner, with shared responsibilities among the key actors (Angerhofer and Angelides 2006). In fact, Kempainen and Vepsäläinen (2007) claim that today's firms prefer dyadic relations only with some selected partners and that collaboration is limited to order processing and operational scheduling. Similarly, Fawcett and Magnan (2002) found that true collaboration beyond the first-tier in upstream and downstream direction is rare.

Supply Chain Integration

Although the topic of supply chain integration may not be formally defined, Lambert et al. (1998) mean that the goal of supply chain integration is to enhance total process efficiency and effectiveness across members of the supply chain. Many authors emphasize both the strategic and operational importance of integration of supply chains (Frohlich and Westbrook 2001; Zailani and Rajagopal 2005). From a strategic perspective, Ajmera and Cook (2009) discuss supply chain integration as partners with joint authority which will share resources, benefits and risks. Similarly, supply chain integration is sometimes interpreted as high level collaboration, where the involved parties act as one entity within an extended enterprise (Wen et al. 2007). Newman et al. (2009) states that supply chain integration has a broader and longer term perspective compared to supply chain collaboration.

One stated benefit of integration is the network's ability to design products faster, with higher quality and lower costs as compared to a single company (Ajmera and Cook 2009). Sharing a similar philosophy, Ragatz et al. (2002) have listed a number of potential benefits from supply chain integration. Integration can add expertise and information regarding new ideas and technologies into each partner's system. Integration can help identify problems as well as solutions ahead of time, facilitate outsourcing, and reduce the internal complexity of various projects. In addition, integration can improve communication and information exchange between companies. Finally, the researchers claim (ibid.) that integration can reduce rework and overall project costs.

A major problem, however, is that various types of supply chain integration seem to exist. Frohlich and Westbrook (2001) present two types of integration for supply chains. The first is the integration and coordination of the forward physical flow of products between supplier, manufacturer and customer. The second is the backward integration and coordination of information technologies and information flowing upstream in the supply chain. Another dimension of supply chain integration is related to scope of

integration; nature and number of companies included in the integrated supply chain. Five scopes have been identified (Fabbe-Costes and Jahre 2007):

- *Limited dyadic downstream*: refers to integration between the focal company and its customers.
- *Limited dyadic upstream*: integration between the focal company and its suppliers.
- *Limited dyadic*: integration between the focal company and its suppliers and customers in both ways, but separately.
- *Limited triadic*: refers to integration of suppliers – focal company – customers (without differentiation between upstream and downstream relationships).
- *Extended*: represents integration between more than three parties along the supply chain, for example, customers' customers, suppliers' suppliers.

Cousins and Menguc (2006) present two different types of integration. They focus on internal integration found within an organization and external integration, which is observed across organizational boundaries and between firms within a supply chain. The basic level of supply chain integration, *intra-organizational* process management emphasizes that the different functional areas within a company should act as a part of an integrated and coordinated process rather than act as functional "silos" within a company (Morash and Clinton 1998). The second level of supply chain integration refers to *inter-organizational* collaborative integration (Bowersox 1990). Close and interactive long-term relationships with customers and suppliers are the main characteristics of collaborative integration. The focus is on the behavioral, communicational, and interactive flows of the supply chain.

One could argue that similar to collaboration, integration also exists on different hierarchical levels. In the supply chain context, external integration is perceived as being more advanced as compared to internal integration, which is needed to ensure the success of higher levels of assimilation. Newman et al. (2009), for example, argues that external integration would not be successful without a successful internal integration. The authors stress the importance of the development of supply chain capabilities as well as maintaining lower levels of integration even after high levels have been attained. Stevens (1990) states that prerequisite for subsequent successful inter-organizational integration with suppliers and customers is the intra-organizational process integration. In other words, integrated supply chain management requires that various departments within an organization are integrated before the extended enterprise can work together as one (Wen et al. 2007).

Sustainability (Sustainable SCM)

The term sustainability rapidly is being adopted in the business community as an increasing number of companies today generate individual sustainability reports. However, the term sustainability seems to have at least as many definitions as does supply chain management. The most frequently quoted definition of sustainability comes from the Brundtland Commission (World Commission on Environment and Development 1987), which defines sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their needs." However, this definition of the term is macroscopic in nature and it provides little guidance to organizations on how they can become more sustainable. A more comprehensible concept for organizational sustainability is instead the concept of the triple bottom line as presented by Elkington (1998), which simultaneously considers and balances economic, environmental, and social goals. The triple bottom line (TBL) suggests that, at the intersection of social, environmental, and economic performance are activities that an organization can engage in which not only are beneficial from a social and environmental standpoint, but that also make economic sense and result in competitive advantage for the firm (Elkington 1998).

While reviewing the sustainability literature, Carter and Rogers (2008) found that there were other aspects of sustainability often mentioned but rarely included in explicit definitions. These aspects are risk management, transparency, strategy, and culture. Carter and Rogers highlighted each of these areas and showed the relationship between them and the triple bottom line theory. Based on their complementary definitions of sustainability and a review of supply chain management literature, Carter and Rogers proposed their own model for and definition of sustainable supply chain management. They defined SSCM as "the strategic, transparent integration and achievement of an organization's social, environmental, and economic goals in the systematic coordination of key inter-organizational business

processes for improving the long-term economic performance of the individual company and its supply chains.” They conceptualize this definition in a model as shown in Figure 5. However, the proponents of sustainable supply chain management do not provide any information or guidelines for how to implement SSCM.

FIGURE 5
SUSTAINABLE SUPPLY CHAIN MANAGEMENT



DISCUSSION

One of the most apparent challenges for SCM in comparing and analyzing the definitions, frameworks, the terminology and the research is that there seems to be a somewhat contradictory discussion of SCM. This confusion exists both in the academic as well as practitioner communities (Stock and Boyer 2009). For example, while most scholars agree that SCM includes integration and collaboration among chain members, there is still a lack of a commonly accepted definition as well as a commonly accepted framework varying conceptualizations of how SCM should be defined. In addition to this obvious problem for the field, there are several other issues. In the following section we discuss these issues.

Dyadic Not Supply Chain

Both theoretical and academic discussion of supply chain management often focuses on the entire chain or network, from raw material to end consumer. Yet, once the discussion deals with more concrete aspects of supply chain management, the focus seems to shift to how to make the internal process, or a dyadic relationship, more efficient and effective. Thus, in reality, SCM research and practice does not seem to extend beyond dyadic relationships.

Process Management before Supply Chain Management

On a positive note, a common thread is the importance of cross-functional processes, to be process orientated, and to apply process management. The SCOR, GSCF and CPFR frameworks also promote cross-organizational collaboration. Collaboration in CPFR takes place between organizations and usually within a certain interface, for example, a web tool, while SCOR and GSCF emphasize the importance of intra-company connectedness as well. The sustainable supply chain management concept is based on systematic coordination of key processes for improved performance of both individual companies and the entire supply chain. The assumption is that organizations have to manage their own processes before they can progress to manage processes at the cross-organizational level. Similarly, the discussions about collaboration and integration suggest that for two or more companies to proceed to a higher level of collaboration or integration, they first need to manage their internal processes. The underlying notion is that companies need to fully commit to process orientation *and* process management in order to succeed with SCM. Process orientation is important since an organization's value-adding capabilities depend on how well cross-functional processes are managed (Naslund 1999; Holmen et al 2005). One main reason for process orientation is therefore to move away from the functional structure and functional goals to increase customer focus and to reduce the risk of sub-optimization (Hammer 2002; Beretta 2002).

Measurements and Benchmarking

It is remarkable how little emphasis appears to be focused on performance measurement systems for enhancing the design and operational efficiencies of supply chains. On the other hand, given how difficult it has been for organizations to develop process-based performance measurement systems, or even properly running measurement systems in general, then it is perhaps not surprising that SCM is lacking in this area as well. Organizations often measure outcomes or results against a predetermined set of targets for component units (e.g., individuals, departments, profit centers, plants). This approach assumes that if all units achieve their targets then the overall strategic goals will be met (Becker and Joroff 2000). Yet, while companies may know how their marketing or manufacturing function is performing, this may not indicate how well the key processes are performing. Functional, results-oriented measures can lead to sub-optimization (Becker and Joroff 2000) and they may undermine an organization's ability to use its' measurement system to improve processes and make better decisions. Bourne et al. (2003, p.4) mean that these measurement systems can be characterized as *"...internally focused, backward looking, and more concerned with local departmental performance than with the overall performance of the business"*. Thus, many measurement systems not only ignore the process view of an organization but can also be counterproductive. Therefore, organizations should strive to develop process based measurement systems (see e.g. Neely et al. 2002; Näslund and Axman 2009). The SCOR model does include performance benchmarking and best practice analysis. The Supply Chain Council maintains a source of data and information compiled from their members to provide assistance in both performance benchmarking and best practice analysis. This is considered a major strength by many SCOR users (Lambert et al. 2005). On the other hand, since firms and industries differ from one another in their focus, metrics, and processes, it may be difficult to conduct a meaningful comparison without standardized processes.

Standards

Several authors have suggested that SCM requires standardization of business process in order to create a common terminology and to be able to link-up processes (Lambert et al. 2005). Yet industry standards for process/SCM is an under developed area with few conducted research studies. Nelson, et al. (2005), for example, conducted a comparative analysis of nine different industry consortia and their standards. Näslund and Williamson (2008) conducted an in depth case study concerning papiNet as an illustration of how a process based industry standard can promote SCM in an industry. PapiNet is global standards initiative in order to develop more efficient supply chain processes for the forest and paper industries. PapiNet, which was initiated in 1999, is based on Extensible Markup Language (XML) *"papiNet XML documents support electronic message transaction standard for the entire wood products industry that enable efficient logistics and information flow throughout the entire supply-chain, from the producer to the end customer."* (www.papiNet.org). Implementation is carried out via groups dealing with specific implementation issues in various market segments.

Relationships

An increasingly important unit of analysis for understanding SCM is the relationship between firms. Relationships can be defined in a myriad of ways and include several key components – including collaboration and integration among involved participants. Some of the more frequently discussed challenges of these relationships include trust and information sharing - Nearly all SCM frameworks are affected by issues relating to trust within the supply chains themselves. Similarly, mutual understanding among trading partners is not only a suggested requirement for supply chain integration, it is a necessary component within that relationship to ensure the overall success of the collaboration between the involved entities. Significantly integrated and collaborative relationships cannot, and should not, be established with all partners in the supply chain as it requires a long term commitment between the involved parties and, at this level of collaboration, companies share strategic and vital information. Furthermore, while it seems primary to suggest that organizations be open with one another and share data across company boundaries, it seems more difficult to put into practice. Information sharing can potentially result in both a loss of information control and a decreased level of information security within participating organizations. Privacy and security concerns are thus of considerable importance since companies will be dealing with sensitive or confidential data regarding their partners. This particular issue can be a deal breaker for collaboration between two companies. Furthermore, establishing collaborative or integrated relationships requires different forms of investment. In addition to the previously discussed challenges, successful collaboration among organizations requires an often sizable investment in information technology.

CONCLUDING DISCUSSION

The field of SCM has gained in importance over the last few decades and there are many signs indicating that the field will continue to grow in importance – both in terms of research and for practitioners. SCM benefits and the required conditions necessary to achieve these benefits, such as process management and cross-functionality, breaking down silos, emphasis on customer satisfaction, process orientation, and information sharing have been discussed for decades. However, SCM also has many problems. Stock and Boyer discuss the problem with the confusion that exists amongst researchers, and practitioners, due to the multitude of suggested SCM definitions. They write “...a consensus definition of SCM is of significant importance in the advancement of SCM theory and practice.”

Furthermore, while many scholars agree that SCM includes certain key concepts, such as integration and collaboration/cooperation among chain members, these concepts are still poorly defined – with multiple meanings to both researchers and practitioners. Since the mentioned concepts obviously are important to the development of SCM, they need to be further explored and defined. Similarly, additional concepts such as sustainability, for example, will probably be even more important in the future. Other dimensions, such as globalization, will have significant impact on many organizations and thus they will have to adapt to these global conditions. All indications are also the information technology and information systems will be increasingly important.

For all these reasons, both the research and practitioner communities should be aware of the hype and potentially unrealistic claims concerning SCM. As our review indicates, there is a lack of empirical research to confirm the significant stated benefits of SCM. Although a majority will agree to the importance and potential benefits of SCM, somehow SCM does not seem to occur often enough in practice. Organizations appear to have significant difficulties in evolving from theory to the successful implementation and practice of supply chain management. This is a crucial yet challenging dilemma to solve. In many cases, we do not have seamless chains, optimized flows, or networks of integrated organizations. In reality, the frameworks and their corresponding terminologies, once more aptly illustrated, ultimately are dealing with companies trying to make dyadic relationships better. Therefore, we need methodical approaches to the implementation of SCM and we need sound empirically based research to continue to develop the field – and to explore the concepts related to SCM. It will require significant efforts, applying both qualitative and quantitative research projects to further develop these concepts in order to advance both practical applications and academic theories.

One additional aspect that requires discussion is the challenge in designing, developing and managing cross-organizational processes when organizations are still struggling with internal process management.

Few, if any, examples exist of truly process-oriented organizations. Yet process management is, in many ways, mentioned as a prerequisite for supply chain management. As a final thought, supply chain management is complex, it is often yet still poorly defined and it includes innumerable concepts and ideas that need clarification. The supply chain does not have clear roles or rules, nor does it have measurement or reward systems. How can such a structure possibly be managed?

REFERENCES

Accenture (2010), presentation at Lund University, Sweden, May.

Ajmera, A. and Cook, J. (2009). A Multi-Phase Framework for Supply Chain Integration. *S.A.M. Advanced Management Journal*, 74, (1), 37-47.

Angerhofer, B. and Angelides, M. (2006). A model and a performance measurement system for collaborative supply chains. *Decision Support Systems*, 42, (1), 283-292.

Attran, M. and Attran, S. (2007). Collaborative supply chain management, the most promising practice for building efficient and sustainable supply chains. *Business Process Management Journal*, 13, (3), 390-404.

Becker, F. and Joroff, M., (2000). Assessing Performance, from Corporate Real Estate 2000: Reinventing the Workplace, *International Development Research Council, IDRC*, 97-113.

Beretta, S. (2002). Unleashing the Integration Potential of ERP Systems. *Business Process Management Journal*, 8, (3), 254-277.

Bourne, M., Neely, A., Mills, J., & Platts, K. (2003). Implementing performance measurement systems: a literature review. *International Journal of Business Performance Management*, 5, (1), 1-24.

Bowersox, D.J. (1990). The Strategic Benefits of Logistics Alliances. *Harvard Business Review*, (July-August), 68, (4), 36-45.

Bowersox, D.J., Closs, D.J. & Stank, T.P. (1999). 21st Century Logistics: Making Supply Chain Integration a Reality. Council of Logistics Management (CLM), Chicago, IL.

Burgess, K., Singh, P. & Koroglu, R. (2006). Supply Chain Management: A Structured Literature Review and Implications for Future Research. *International Journal of Operations and Production Management*, 26, (7), 703-729.

Carter, C., and Rogers, D. (2008). A framework of sustainable supply chain management: moving toward new theory. *International Journal of Physical Distribution & Logistics Management*, 38, (5), 360-387

Cassivi, L. (2006). Collaboration planning in a supply chain. *Supply Chain Management: an International Journal*, 11, (3), 249-258.

Cooper, M.C., Lambert, D.M. & Pagh, J.D. (1997). Supply Chain Management. More Than a New Name for Logistics. *The International Journal of Logistics Management*, 8, (1), 1-13.

Cousins, P. and Bulent Menguc, B. (2006). The implications of socialization and integration in supply chain management. *Journal of Operations Management*, 24, (5), 604-615.

Croxton, K., García-Dastugue, S., Lambert, D. & Rogers, D. (2001). The Supply Chain Management Process. *International Journal of Logistics Management*, 12, (2), 13-36.

- Elkington, J. (1998). *Cannibals with forks: The Triple Bottom Line of the 21st century*. Stoney Creek:New Society Publishers
- Fabbe-Costes, N., Jahre, M. & Roussat, C. (2009). Supply chain integration: the role of logistics service providers. *International Journal of Productivity and Performance Management*, 58, (1), 71-91.
- Fabbe-Costes, N. and Jahre, M. (2007). Supply chain integration improves performance: the Emperor's new suit? *International Journal of Physical Distribution & Logistics Management*, 37, (10), 835-855.
- Fawcett, S.E. and Magnan, G.M. (2002). The rhetoric and the reality of supply chain integration". *International Journal of Physical Distribution & Logistics Management*, 32, (6), 339-361.
- Fisher, M. (1997). What Is the Right Supply Chain for Your Product? A Simple Framework – Can You Figure Out The Answer? *Harvard Business Review*, 75, (2), 105-116.
- Fliedner, G. (2003). CPFR: an emerging supply chain tool. *Industrial Management & Data Systems*, 103, (1), 14-21.
- Frohlich, M. and Roy Westbrook, R. (2001). Arcs of integration: an international study of supply chain strategies. *Journal of Operations Management*, 19, (2), 185-200.
- Gruat La Forme, F-A., Botta Genoulaz, V. & Campagne, J-P. (2007). A framework to analyse collaborative performance. *Computers in Industry*, 58, (7). 687.
- Halldorsson, A., Larsson, P.D. & Poist, R.F. (2008). Supply chain management: a comparison of Scandinavian and American perspectives. *International Journal of Physical Distribution & Logistics Management*, 38, (2), 126-142.
- Hammer, M. (2002). Process Management and the Future of Six Sigma. *Sloan Management Review*, 43, (2), 26-32.
- Holweg, M., Disney, S., Holmström, J. & Småros, J. (2005). Supply Chain Collaboration: Making Sense of the Strategy Continuum. *European Management Journal*, 23, (2), 170-181.
- Huan, S., Sheoran, S. & Wang, G. (2004). A review and analysis of supply chain operations reference (SCOR) model. *Supply Chain Management: an International Journal*, 9, (1), 23-29.
- Hertz, S. (2001). Dynamics of Alliances in Highly Integrated Supply Chain Networks. *International Journal of Logistics: Research Applications*, 4, (2), 237-256.
- Holmen, E., Pedersen A-C. & Torvatn, T. (2005). Building Relationships for Technological Innovation. *Journal of Business Research*, 58, 1240-1250.
- Jarillo, J.C. and Stevenson, H.H. (1991). Co-operative strategies: the payoffs and the pitfall. *Long Range Planning*, 24, (1),. 64-70.
- Kemppainen, K. and Vepsäläinen, A.P.J. (2007). Logistical and technological differentiation as a precondition of supply networking. *International Journal of Logistics Management*", 18, (1), 81-101.
- Kleindorfer, P., Singhal, K. & Van Wassenhove, L. (2005). Sustainable Operations Management. *Production and Operations Management*, 14, (4), 482-492.
- Lambert, D.M., Cooper, M.C. & Pagh, J.D. (1998). Supply Chain Management Implementation Issues and Research Opportunities. *The International Journal of Logistics Management*, 11, (1), 1-17.

- Lambert, D. (2008). *An executive summary of Supply Chain Management: Process, Partnerships, Performance*, Jacksonville: The Hartley Press, Inc.
- Lambert, D., Garcia-Dastugue, S. & Croxton, K. (2005). An evaluation of process-oriented supply chain management frameworks. *Journal of Business Logistics*, 26, (1), 25-51.
- Lamming, R., Johnsen, T., Zheng, J. & Harland, C. (2000). An initial classification of supply networks. *International Journal of Operations & Production Management*, 20, (6), 675-691.
- Lee, H., Padmanabhan, V. & Whang, S. (1997). Information Distortion in a Supply Chain: the Bullwhip Effect. *Management Science*, 43, (4), 546-558.
- Lockamy III, A. and McCormack, K. (2004). Linking SCOR planning practices to supply chain performance, an exploratory study. *International Journal of Operations & Business Management*, 24, (12), 1192-1218.
- Lummus, R. and Vokurka, R. (1999). Defining Supply Chain Management: A Historical Perspective And Practical Guidelines. *Industrial Management and Data System*, 99, (1), 11-17.
- McCarthy, T. and Golicic, S (2002). Implementing Collaborative Forecasting to Improve Supply Chain Performance. *International Journal of Physical Distribution and Logistics Management*, 32, (6), 431-454.
- Melnyk, S., Stank, T. & Closs, D. (2000). Supply Chain Management at Michigan State University: The journey and the lessons learnt. *Production and Inventory Management Journal*, Third quarter 2000, 13-18.
- Mentzer, J.T., DeWitt, W., Keebler, J.S., Min, S., Nix, N.W., Smith, C.D. & Zacharia, Z.G. (2001). What is supply chain management. in Mentzer, J.T. (Ed.), *Supply Chain Management*, Sage, Thousand Oaks, CA, pp. 1-25.
- Mentzer, J.T., DeWitt, W., Keebler, J.S., Min, S., Nix, N.W., Smith, C.D., & Zacharia, Z.G. (2002). Defining Supply Chain Management. *Journal of Business Logistics*, 22, (2), 1-25.
- Mentzer, J.T. (2004). *Fundamental of Supply Chain Management*, Thousand Oaks, California: SAGE Publications.
- Morash, E.A. and Clinton, S.R. (1998). Supply Chain Integration: Customer Value Through Collaborative Closeness Versus Operational Excellence. *Journal of Marketing Theory and Practice*, 6, (4), 104-121.
- Neely, A., Adams, C. & Kennerly, M. (2002). *The Performance Prism: The Scorecard for Measuring and Managing Business Success*, Prentice-Hall, Hemel Hempstead.
- Nelson, M., Shaw, M. & Qualls, W. (2005). Interorganizational System Standards Development in Vertical Industries, *Electronic Markets*, 15, (4), 378-392.
- Neureuther, B.D. (2009). Managing risks and disruptions on global supply chains. *Journal of Marketing Channels*, 16, (3), 189-191.
- Newman, R., Hanna, M., Gattiker, T. & Huang, X. (2009). Charting Supply Chain Management Integration and Initiatives: A Framework to Guide Implementation. *American Journal of Business*, 24, (1), 19-31.
- Näslund, D. (1999), *Towards Bridging the Gap Between Strategy and Operations – a process based framework*, Dissertation, Lund University.

- Näslund, D. and Williamson, S. (2008). Supply chain Integration: barriers and driving forces in an action research based industry intervention. *Supply Chain Forum – An International Journal*, 9, (1), 70-80.
- Näslund, D. and Axman, N. (2009). Process Based Performance Measurement Systems: Driving Forces and Barriers, *International Journal of Logistics and Transport*, 3, (2), 91-113.
- Ragatz, G., Handfield, R. & Petersen, K. (2002). Benefits associated with supplier integration into new product development under conditions of technology uncertainty. *Journal of Business Research*, 55, (5), 389-400.
- Sabath, R. and Fontanella, J. (2002). The Unfulfilled Promise of Supply chain Collaboration. *Supply Chain Management Review*, 6, (4), 24-29.
- Srivastava, R., Shervani, T. & Fahey, L. (1999). Marketing, Business Processes, and Shareholder Value: An Organizationally Embedded View of Marketing Activities and the Discipline of Marketing. *Journal of Marketing*, 63, (4), 168-179.
- Stank, T., Keller, S. & Daugherty, P. (2001). Supply Chain collaboration and logistical service performance. *Journal of Business Logistics*, 22, (1), 29-48.
- Stevens, G.C. (1990). Successful Supply-Chain Management. *Management Decision*, 28, (8), 25-30.
- Stewart, G. (1997). Supply Chain Operations Reference Model (SCOR): The First Cross-Industry Framework For Integrated Supply chain Management. *Logistics Information Management*, 10, (2), 67-70.
- Stock, J. and Boyer, S. (2009). Developing a consensus definition of supply chain management: a qualitative study. *International Journal of Physical Distribution & Logistics Management*, 39, (8), 690-711.
- Stock, J. Stefanie L. Boyer, S. & Harmon, T. (2010). Research opportunities in supply chain management. *Journal of the Academy of Marketing Science*, 38, (1), 32-41.
- Svensson, G. (2007). Aspects of sustainable supply chain management (SSCM): conceptual framework and empirical example. *Supply Chain Management: an International Journal*, 12, (4), 262-266.
- Tan, K.C., Lyman, S., & Wisner, J. (2002). Supply chain management: a strategic perspective. *International Journal of Operations and Production Management*, 22, (6), 614-631.
- Tatoglu, E. and K. W. Glaister, (1999). Strategic motives and partner selection criteria in international joint ventures in Turkey: perspectives of western firms and Turkish firms. *Journal of Global Marketing*, 13, (3), 53-92.
- Tokman, M., Elmadag, A.B., Uray, N. & Richey, R.G.Jr. (2007). Exploring the development of supply chain international joint ventures. *International Journal of Physical Distribution & Logistics Management*, 37, (6) 442-453.
- Tummala, V.M. Rao, C., Phillips, M. & Johnson, M. (2006). Assessing Supply Chain Management Success Factors: A Case Study. *Supply Chain Management: An International Journal*, 11, (2), 179-192.
- Wen, C., Li, X. & Bai, Y. (2007). Research on Dynamic Supply Chain Integration Network Model Based on Collaboration Theory and Non-Linear Polya Processes. *2007 International Conference on Wireless Communications, Networking and Mobile Computing*, 6085-6088.

Zailani, S. and Rajagopal, P. (2005). Supply chain integration and performance: US versus East Asian companies. *Supply Chain Management: An International Journal*, 10, (5), 379-393.

www.cscmp.org

www.scm-institute.org

www.supply-chain.org

www.papiNet.org