


# Supply chain management: theory and its future perspectives

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## Supply chain management: theory and its future perspectives

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### Abstract

Supply chain management (SCM) has been widely researched in numerous application domains during the last decade. Despite the popularity of SCM research and applications, there remains considerable confusion as to its meaning. There are several attempts made by researchers and practitioners to appropriately define SCM. Amidst fierce competition in all industries, SCM has gradually been embraced as a proven managerial approach to achieving sustainable profits and growth. This is accomplished primarily by focusing on the whole SCM process to deliver the right products or services, in the right quantity, to the right place, at the right time and with the maximum benefits. The researcher utilized secondary data, including digital libraries, online databases, journals, etc. to review SCM research papers in different aspects. This exploratory study reveals the evolution of SCM in various industries, including manufacturing and service industries, and its future trends. This paper would unlock frontiers for substantial researchers in order to further development in respect of SCM areas.

*Keywords:* supply chain management (SCM), manufacturing, service, education

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### 1. Introduction

During last decade, researchers usually focused on Supply chain management (SCM) issues in profit organizations. Research objectives may include adding value, reducing cost, or slashing response time in various parties involved in the manufacturing supply chain. However, very few studies were attempted in non-profit organizations. An extremely scarce number of research papers focused on SCM in the academia.

Hay (1990) states that a profit organization attempts to maximize profits, whereas a non-profit organization considers monetary returns of less importance. Their major objectives may include improved literacy rate, better quality of life, equal opportunities for all genders or races, etc. The revenues gained by a non-profit organization would be used primarily to balance the expenditure of the organization. Due to conflicting objectives, managing a successful profit organization may be drastically different from a non-profit organization (Firstenberg, 1996; Drucker, 1992). Recently, an increasingly large number of research studies highlight the criticalness of SCM as a means to assuring organizational success.

SCM assists the business organization to compete in the dynamic international market. The objective of SCM is to incorporate activities across and within organizations for providing the customer value. This should also be applicable to the academia, which represents a type of non-profit organizations. The goal is to provide the society value by producing high quality graduates and research outcomes. An integrated educational supply chain involves coordination and information sharing up and down the process among all stakeholders. With technology facilitating information flow, a coordinated supply chain can be designed to meet the strategic, planning, and operating objectives of the educational institutions. It also means establishing effective and feasible relationships both inside and outside the organization (Sandelands, 1994).

SCM is needed for various reasons: improving operations, better outsourcing, increasing profits, enhancing customer satisfaction, generating quality outcomes, tackling competitive pressures, increasing globalization, increasing importance of E-commerce, and growing complexity of supply chains (Stevenson, 2002). Supply chains are relatively easy to define for manufacturing industries, where each participant in the chain receives inputs from a set of suppliers, processes those inputs, and delivers them to a different set of customers. With educational institutions, one of the primary suppliers of process inputs is

customers themselves, who provide their bodies, minds, belongings, or knowledge as inputs to the service processes (Habib and Jungthirapanich, 2009).

This exploratory study reveals the following objectives:

- Analysis the overview of SCM through different citations.
- Review extensive literature reviews regarding SCM based on secondary data.
- Define the SCM and the evolution of SCM.
- Analysis the trends of SCM and its future perspectives.

## 2. Literature Review

The term, “supply chain management,” has risen to eminence over the last ten years. About 13.55% of the concurrent session titles contained the words “supply chain” at the 1995 Annual Conference of the Council of Logistics Management. The number of sessions containing the term rose to 22.4% at the 1997 conference, just two years later. The term is commonly used to illustrate executive responsibilities in corporations (La Londe, 1997). SCM has become such a “hot topic” that it is difficult to pick up a periodical on manufacturing, distribution, marketing, customer management, or transportation without seeing any article about SCM or SCM-related topics (Ross, 1998).

Some authors defined SCM in operational terms involving the flow of materials and products, some viewed it as a management philosophy, and some viewed it in terms of a management process (Tyndall et al., 1998), some viewed it as integrated system. Authors have even conceptualized SCM differently within the same article: as a management philosophy on the one hand, and as a form of integrated system between vertical integration and separate identities on the other hand (Cooper and Ellram, 1993).

According to Christopher (1994), a supply chain is “a network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer.” An example of a basic supply chain is shown in Figure 1.

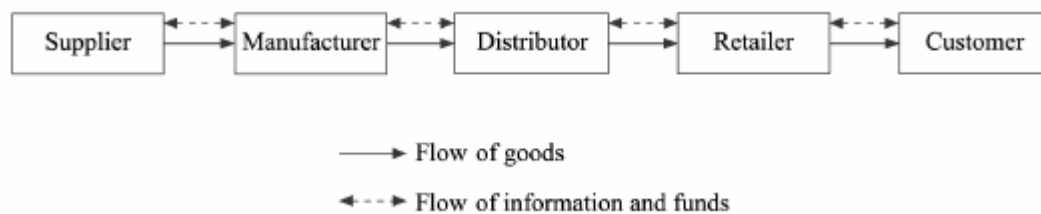


Figure 1. The Basic Supply Chain (Chopra and Meindl, 2001)

The supply chain includes suppliers, manufacturers, distributors, retailers, and customers. The customers are the main focus of the chain, since the primary purpose of the existence of any supply chain is to satisfy customer needs, in the process generating profit for itself (Chopra and Meindl, 2001). SCM was initially related to the inventory management within a supply chain. This concept was later broadened to include management of all functions within a supply chain. According to Chopra and Meindl (2001), “SCM engages the management of flows between and among stages in a supply chain to minimize total cost”. This definition implies that SCM involves management of flows of products, information, and finance upstream and downstream in the supply chain.

In the course of time, the most considerable benefits to businesses with advanced SCM capabilities will be radically improved customer responsiveness, developed customer service and satisfaction, increased flexibility for changing market conditions, improved customer retention and more effective marketing (Horvath, 2001).

SCM is a concept, “whose primary objective is to integrate and manage the sourcing, flow, and control of materials using a total systems perspective across multiple functions and multiple tiers of suppliers” (Monczka, Trent and Handfield, 1994). Stevens (1989) stated the objective of SCM was to synchronize the customers’ requirements with materials flow to strike a balance among conflicting goals of maximum customer service, minimum inventory management, and low unit costs.

The supply chain is viewed as a single process. Responsibility for the different divisions in the chain is not fragmented and transferred to functional areas such as manufacturing, purchasing, distribution, and sales. SCM calls for, and in the end depends on, strategic decision-making. “Supply” is a shared objective of practically every function in the chain and is of particular strategic importance because of its impact on overall costs, profits and market share. SCM calls for a different point of view on inventories that are utilized as a balancing mechanism of last, not first, resort. A latest approach to systems is required - integration rather than interfacing (Houlihan, 1988).

SCM is delivering major economic benefits to businesses as diverse as manufacturing, retail, and service organizations, etc. (Horvath, 2001). The scope of SCM was further expanded to include re-cycling (Baatz, 1995). SCM deals with the total flow of materials from suppliers through end users (Jones and Riley, 1985). It highlights “total” integration of all stakeholders within the

supply chain, a realistic approach is to consider only strategic suppliers and customers since most supply chains are too complex to attain full integration of all the supply chain entities (Tan et al., 1998).

Supply chain strategy includes “two or more firms in a supply chain entering into a long-term agreement; the development of mutual trust and commitment to the relationship; the integration of logistics events involving the sharing of demand and supply data; the potential for a change in the locus of control of the logistics process” (La Londe and Masters, 1994). Manufacturers are able to develop alternative conceptual solutions, select the best components and technologies, and assist in design assessment by involving suppliers early in the design stage, (Burt and Soukup, 1985).

SCM incorporates logistics into the strategic decisions of the business (Carter and Ferrin, 1995). Eventually, the philosophy developed and combined into a common body of knowledge that encompassed all the value-adding activities of the manufacturers and logistics providers (Tan, 2001). Many SCM strategic models have been investigated to link its vital role in overall strategic corporate planning (Frohlich et al., 1997; Watts et al., 1992). Experts agree that a formal supply chain strategy will be critical to both manufacturing and service industries (Kathawala, 2003).

Such ambiguity suggests a need to examine the phenomena of SCM more closely to define clearly the term and concept, to identify those factors that contribute to effective SCM, and to suggest how the adoption of an SCM approach can affect corporate strategies, plans, operations and performance.

Proper performance measures and metrics including activity-based costing and management may be helpful in identifying non-value-adding activities across a supply chain. Total Quality Management (TQM) methods can be utilized to eradicate these inefficiencies, thereby improving the overall effectiveness of a supply chain. Customer demands and supply chain relationships are the key in selecting the most appropriate method of target costing for supply chains. Activity-based, process-based, value-based and cost management approaches may be fit for TQM in SCM (Lockamy and Smith, 2000).

## **2.1 Definitions of SCM**

American Production and Inventory Control Society (APICS, 1990) define the supply chain as the processes from the initial raw materials to final consumption of the finished products linking across supplier-user industries. The supply chain constitutes all functions within and outside an industry, which enable the value chain to make products and provide services to customers (Inman, 1992). Some researchers suggested a clearer SCM definition by adding the information system necessary to monitor all of the activities (Lee, 2002; Morgan, 1995; Srinivas, 2002).

Recently, the Council of SCM Professionals (CSCMP), which is the premier organization of supply chain practitioners, researchers, and academicians, has defined SCM as: “SCM 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, SCM integrates supply and demand management within and across companies” (Ballou, 2007).

Scott and Westbrook (1991) described SCM as the chain linking each element of the manufacturing and supply process from raw materials to the end user. This management philosophy focused on how firms utilized their suppliers’ processes, technology, information, and capability to enhance competitive advantage (Farley, 1997), and the coordination of the manufacturing, materials, logistics, distribution and transportation functions within an organization (Lee and Billington, 1992). SCM is an integrative philosophy to manage the total flow of a distribution channel from supplier to the ultimate user (Cooper et al., 1997).

Supply chain is defined as all the activities involved in delivering a product from raw materials to the customer including sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, delivery to the customer, and the information systems necessary to monitor all of these activities. SCM coordinates and integrates all of these activities into a seamless process. It links all of the stakeholders in the chain including parties within an organization and the external partners including suppliers, carriers, third party companies, and information systems providers (Lummus, 1999).

SCM is defined as the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular organization and across businesses within the supply chain, for improving the long-term performance of the individual organization and the supply chain as a whole (Mentzer and et al., 2001).

Most of the recent SCM literature focused on the purchasing function, stating that it was a basic strategic business process, rather than a specialized supporting function (Wisner and Tan, 2000). It was a management philosophy that extended traditional internal activities by adopting an inter-enterprise scope, allowing trading partners together with the common goal of optimization and efficiency (Harwick, 1997).

The customized definition for the service industry is as follows: The SCM for the service industry is the ability of the company/firm to get closer to the customer by improving its supply chain channels. The services supply chain will include responsiveness, effectiveness, efficiency, and controlling (Kathawala, 2003). One of the primary suppliers of process inputs is customers themselves in service organizations. This concept of customers being suppliers is recognized as ‘customer-supplier duality.’ The duality implies that service supply chains are bi-directional (Sampson, 2000). The concept may be applicable to the academia as well.

Integrated SCM is about going from the external customer and then managing all the processes that are needed to provide the customer with value in a horizontal way (Monczka and Morgan, 1997). Generally, SCM comprises integrated functions from raw

materials to final products. It also covers integrated management of every organization throughout the whole chain (Horvath, 2001; Srinivas, 2002). An analysis of SCM for manufacturing illustrates the integrated processes required for managing goods from the initial source of supply to point of consumption. It also includes a wide range of activities that material and service suppliers, manufacturers, wholesalers, and retailers have performed for years. Each supply chain participants manage to enhance performance of their own enterprises. Very little concentration is given to the benefits of managing the total supply chain process on an integrated basis (Closs, 1995).

SCM, as applied to manufacturing, has been defined differently. These varieties of definitions often carry through to the extent that the key people in the same organization are not speaking about the same things, when they discuss the concept of SCM (Monczka and Morgan, 1997).

First, there are definitions characterized by the simplest concepts of SCM, one is “the ability to get closer to the customer” (Weil, 1998). Another is that the supply chain is the flow of information and material from suppliers to customers (Crom, 1996). A company’s supply chain, either internal or external, is a resource to be exploited for better market position and enhanced competitive advantage. Strategic use of this resource requires that companies do the following (Monczka and Morgan, 1997):

- (1) Gain a closer understanding of their customer’ and future customers’ needs, both nationally and internationally;
- (2) Understand their suppliers’ core competencies in meeting customer needs;
- (3) Determine where redundancies and inefficiencies lie within the supply chain in relation to current and future competitive needs;
- (4) Develop relationships and alliances with suppliers who have key competencies that strengthen, supplement, and enhance internal core competencies nationally and internationally.

SCM, from the viewpoint of a manufacturing sector, may be defined as “taking control of all goods within the supply chain, all materials, no matter how to handle or manage (Sandelands, 1994).” In particular, SCM is the process of effectively managing the flow of materials and finished goods from retailers to customers using the manufacturing facilities and warehouses as potential intermediate steps (Sengupta and Turnbull, 1996).

## **2.2 Evolution of SCM**

The supply chain literature review was conducted to study the past researches. Before the 1950s, logistics was thought of in military terms (Ballou, 1978). It had to do with procurement, maintenance, and transportation of military facilities, materials, and personnel. The study and practice of physical distribution and logistics emerged in the 1960s and 1970s (Heskett et al., 1973).

The logistics era prior to 1950 has been characterized as the “dormant years,” when logistics was not considered a strategic function (Ballou, 1978). Around 1950s changes occurred that could be classified as a first “Transformation.” The importance of logistics increased considerably, when physical distribution management in manufacturing firms was recognized as a separate organizational function (Heskett et al., 1964). The SCM concept was coined in the early 1980s by consultants in logistics (Oliver and Webber, 1992). The authors emphasized that the supply chain must have been viewed as a single entity and that strategic decision-making at the top level was needed to manage the chain in their original formulation. This perspective is shared with logisticians as well as channel theorists in marketing (Gripsrud, 2006).

SCM has become one of the most popular concepts within management in general (La Londe, 1997) since its introduction in the early 1980s (Oliver and Webber, 1992). A number of journals in manufacturing, distribution, marketing, customer management, transportation, integration, etc. published articles on SCM or SCM-related topics. The evolution of SCM continued into the 1990s due to the intense global competition (Handfield, 1998). Berry (1994) defined SCM in the electronics industry.

Drucker (1998) went as far as claiming there was a paradigm shift within the management literature: “One of the most significant changes in paradigm of modern business management is that individual businesses no longer compete as solely autonomous entities, but rather as supply chains. Business management has entered the era of inter-network competition and the ultimate success of a single business will depend on management’s ability to integrate the company’s intricate network of business relationships.”

Fernie (1995) adopted SCM in the National Health Service. Sampson (2000) explored the customer supplier duality in the service organizations as it pertained to SCM in the service industry. Kathawala and Abdou (2003) explored supply chain application to the service industry. O’Brien and Kenneth (1996) proposed an educational supply chain as a tool for strategic planning in tertiary education. The study was based on a survey among employers and students. Survey findings revealed that integration and coordination among students and employers should have been promoted. Cigolini et al. (2004) explored a framework for SCM based on several service industries including automobile, grocery, computers, book publishing etc. According to the case study conducted at the City University of Hong Kong, Lau (2007) defined educational supply chain as the ‘Student’ and the ‘Research’ supply chain.

Habib (2009) represents the first large scale empirical study that systematically investigate input of the university, output of the university through educational SCM. This exploratory research addresses the education supply chain, the research supply chain, and educational management as major constituents in an Integrated Tertiary Educational Supply Chain Management (ITESCM) model (Habib and Jungthirapanich, 2010). Its applicability was successfully verified and validated through survey data from leading tertiary educational institutions around the world (Habib, 2010).

The emergence and evolution of SCM may be depicted as a timeline shown in Figure 2:

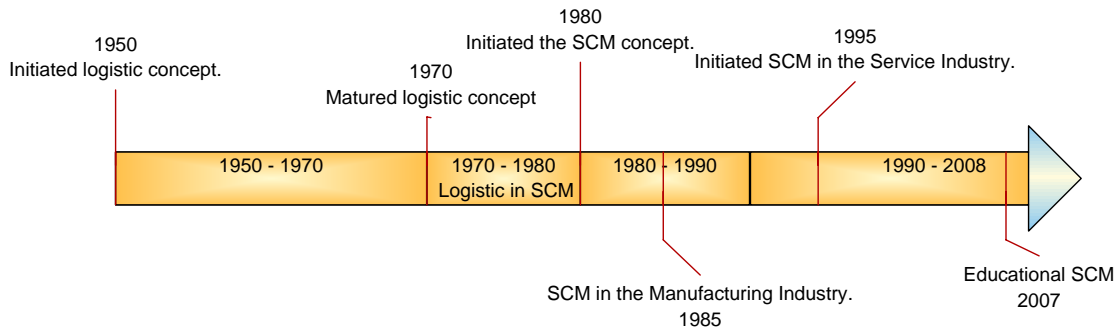


Figure 2. Evolutionary Timeline of SCM (Habib and Jungthirapanich, 2008)

### 3. Research Methodology

The analysis of this research is based on secondary data, including online databases, digital libraries, books, journals, conference papers, etc. Extensive SCM research papers of academicians and practitioners are evolved from renowned international journals, namely PROQUEST, EMERALD, EBSCO, IEEE, ACM, JSTOR, Science Direct, etc. Evolutionary timeline and future trends were developed based on the analysis of literature. The author classifies SCM in different areas of Manufacturing and Service industries.

### 4. Results and Discussion

From all of the above discussions, different citations for the SCM in this research have been summarized in Table 1. This summary described in different SCM aspects in different papers, articles. In this table, SCM is mainly classified into the manufacturing or the service industry. Research studies on SCM in the manufacturing industry are focused in different areas. Based on the citations and definitions, these areas are material flow, integrative, strategic, management, others including inventory, flow of orders, information flow, finished goods flow, coordination, planning, goods progress, networking, design assessment, chain link, recycling, competitive advantage, performance, collaboration, aerospace, and quality. SCM in the service industry is classified into general and education areas. In this study, the researcher focused on sixty (60) references on SCM in the manufacturing and the service industry. Among them, fifty two (52) citations are related to SCM in the manufacturing industry. Eight (8) papers, two of which aim at SCM in education, are relevant to the service industry. Only one research relates to both manufacturing and service sectors.

Table 1. A Summary of SCM Citations in Manufacturing and Service Industries

Citations	Manufacturing					Service	
	Material Flow	Integrative	Strategic	Mgt.	Others	General	Education
Jones and Riley, 1985	#						
Burt and Soukup, 1985					Design Assessment		
Houlihan, 1988		#	#		Inventory		
Stevens, 1989	#						
Jones, 1989	#				Flow of Orders		
Scott and Westbrook, 1991					Chain Link		
Inman, 1992					Value Chain		
Lee and Billington, 1992					Coordination		
Watts et al., 1992			#		Planning		
Cooper and Ellram, 1993		#		#			
Sandelands, 1994				#			
Christopher, 1994					Networking		
La Londe et al., 1994		#	#				
Monczka et al., 1994		#		#			
Berry, 1994		#					
Fernie, 1995						#	
Closs, 1995		#					
Carter and Ferrin, 1995			#				
Baatz, 1995					Recycling		
Morgan, 1995		#			Inform. System		
Crom, 1996	#				Information Flow		
Sengupta and Turnbull, 1996	#				Finished Goods Flow		

Table 1(cont'd). A Summary of SCM Citations in Manufacturing and Service Industries

Citations	Manufacturing				Service		
	Material Flow	Integrative	Strategic	Mgt.	Others	General	Education
O'Brien and Kenneth, 1996							#
Farley, 1997					Competitive Advantage		
Frohlich et al., 1997			#		Planning		
Monczka and Morgan, 1997				#			
Cooper et al., 1997		#					
Harwick, 1997				#			
Tyndall et al., 1998	#			#			
Drucker, 1998		#		#			
Tan et al., 1998		#					
Weil, 1998			#				
Lummus, 1999		#		#	Coordination		
Gilmour, 1999		#					
Tan, 1999					Performance		
Sampson, 2000						#	
Wisner and Tan, 2000			#				
Wisner and Tan, 2000			#				
Stank, 2000					Transportation		
Tan, 2001		#					
Chopra and Meindl, 2001				#			
Horvath, 2001					Collaboration		
Mentzer et al., 2001			#		Coordination		
Tan, 2002			#				
Lee, 2002		#			Inform. System		
Stevenson, 2002					Goods Progress	#	
Srinivas, 2002		#			Inform. System		
Kathawala, 2003						#	
Bales, 2004					Aerospace		
Cigolini et al., 2004						#	
Zailani, 2005		#			Performance		
Samaranayake, 2005		#					
Power, 2005		#					
Tummala et al., 2006					Assessment		
Kim, 2006		#			Performance		
Sila et al., 2006					Quality		
Ballou, 2007				#	Planning		
Lee, 2007		#			Performance		
Lau, 2007							#
Habib and Jungthirapanich, 2009							#

A comparative analysis of SCM in different aspects, including manufacturing industries and service industries, is identified in this research. Figure 3a depicts SCM in manufacturing industries and service industries including educational institutions. On the other hand, Figure 3b focused SCM in manufacturing industries, service industries excluding educational institutions, and education.

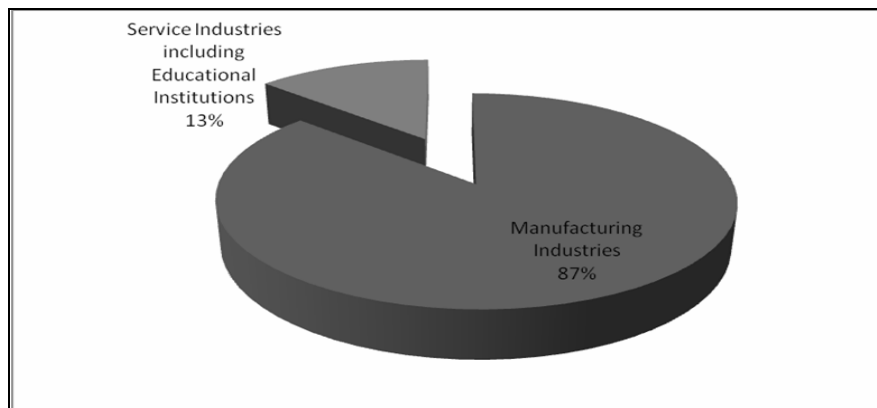


Figure 3a. A Comparative Analysis of SCM in Different Aspects

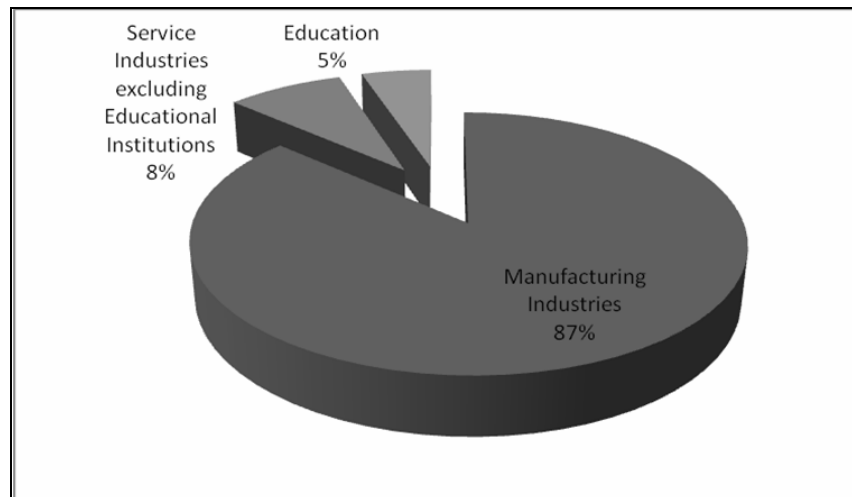


Figure 3b. A Comparative Analysis of SCM in Different Aspects

## 5. Conclusion

From the above mentioned Table 1, Figure 3a and 3b, it is quite clear that, few (13%) and very few researchers (5%) conducted SCM in the service industries and education respectively. Most of them (87%) conducted SCM in the manufacturing industries. It seems to be that SCM in the educational institutions needs more to be explored in the future.

It is a surprising fact that researchers develop supply chain models mostly for improving business operations. Few, particularly academic researchers, do not realize that the research on academic SCM may also be conducted for their own educational institutions. The performance of the SCM depends on the seamless coordination of all supply chain stakeholders to ensure attainment of desirable outcomes. This research is based on only secondary data, though it is the limitation of this paper, however, this study would unlock frontiers for substantial researchers in order to further development in respect of supply chain management arena.

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