Supply Chain Management: Road Ahead With a Literature Review Based Analysis

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Abstract

Supply Chain Management is one area of continuous interest to academicians as well as to practitioners for last two decades. It has shown a very dynamic behavior and recent developments of Information Technology, Green Marketing as well as issue of Sustainability has taken the debate of SCM to greater heights. Researchers over a period of time have discussed SCM from different perspectives. The present paper is an attempt to understand the key domain areas of SCM with the help of detailed literature review encompassing more than 250 published papers. On the basis of these papers and on the basis of direction of external business environment, a road map of future direction for SCM is also proposed in the paper.

Keywords: Supply Chain Management (SCM), Sustainability, Environmental Issues, Technology Management, Archival Research, Qualitative Data Analysis.

1. INTRODUCTION

Supply Chain Management (SCM) is coordination and management of products / service flow, information flow and fund flow from supplier's supplier to customer's customer.

The term Supply Chain Management (SCM) was originally introduced by consultants in the early 1980s (Oliver and Webber 1982). Although the Supply Chain Management (SCM) concept was born at the beginning of the 1980s, research in the field was almost non-existent until the mid-1990s. Since then, the growth of SCM research has been exponential (Alfalla-Luque and Medina-Lopez 2009). The importance of supply chain management has been increasing day-by-day as the number of competitors in the market is increasing. In the new business context, competition is no longer firm against firm, but has moved on to a higher plane, with the generation of supply chain against supply chain competition. (Alfalla-Luque and Medina-López 2009).

The term SCM has been used to explain the planning and control of materials and information flows as well as the logistics activities not only internally within a company but also externally between companies (Cooper, Lambert and Pagh 1997; Fisher 1997). Due to advancement in science and technology and constantly changing market scenario, the scope of Supply Chain Management has expanded, encompassing a number of new elements and also modifying the earlier constructs and definitions. As business markets are getting more and more global, causing stressful competitive environments, undoubtedly the supply chain management of tomorrow will present a much wider and complex scenario.

The present paper is an attempt to understand the various important areas of Supply Chain Management for achieving the common objectives of supply chain partners. At the same time this paper also looks into the future direction of SCM so that practitioners can use the concept of SCM for mutual benefits of all the stakeholders of that supply chain.

2. METHODOLOGY

Extensive literature on Supply Chain Management was reviewed. Around 250 papers on SCM and related fields were reviewed which were published during 1959-2010. After reviewing the papers, they were classified under 23 different headings depending upon their area of discussion. These 23 areas were further divided into 7 important categories which can be considered as pillars

of SCM success. Further their inter-relations were also established and key elements for future directions were proposed.

3. SCM AND ITS IMPLEMENTATION ASPECTS

The SCM literature mainly consists of case studies about supply chains of various companies and also study of specific elements of a supply chain. We have identified and summarized the critical elements of a supply chain through a literature review. The literature review identified 23 elements which form an integral part of supply chain.

These elements with their sources are presented in Table 1.

On the basis of commonality of elements to the operation area of a business, these elements are further grouped into seven categories. These seven categories are proposed as follows:

1. Cost
2. Management structure
3. Quality
4. Marketing
5. Environment
6. Information Technology (IT)
7. Human resource

The frequency of citation of a particular element indicates its importance to the effective Supply Chain Management. The frequency of citation for each element is listed in parenthesis next to it in Table 2.

3.1 Cost

Operations Management helps to achieve the objective of low cost (efficient) supply chain. The core responsibility of operation managers is to ensure that the jobs being

Table 1: Elements of SCM from Literature

IT implementation
Rockhart and Scott Morton 1984; Cooper and Zmud 1990; Dos Santos 1991; Holland, Lockett and Blackman 1992; Henderson and Venkatraman 1993; Benjamin and Wigand 1995; Klouwenberg, Koot and van Schik 1995; Ho 1996; Scott 1996; Calza and Passaro 1997; Lewis and Talalayevsky 1997; Williams 1997; Clarke 1998; Roberts and Mackay 1998; Walton and Gupta 1999; Ang, Davies and Finlay 2000; Ball and Wright 2000; Christiaanse and Kumar 2000; Emiliani 2000; Jayaram, Shawnee and Droge 2000; Lancioni, Smith and Oliva 2000; Motwani, Madan and Gunasekaran 2000; Talluri 2000; Zsidism, Jun and Adams 2000; Kehoe and Boughton 2001; Reyes, Raisinghani and Singh 2002; Simchi-Levi, Kaminsky and Simchi-Levi E. 2003; Gunasekaran and Ngai 2004 Auramo, Kauremaa and Tanskanen 2005.
E-commerce
Benjamin and Wigand 1995; Carbone 1995; Kalakota and Whinston 1996; Murray 1996; Vedder, Guynes and Vanecek 1997; Barsoum 1999; McIvor, Min and Galle 1999; Ball and Wright 2000; Elliman and Orange 2000; Humphreys and Huang 2000; Reynolds 2000; Wang 2000; Murillo 2001; Lancioni, Schau and Smith 2003.
Use of RFID
Jansen and Krabs 1999; Seideman 2003; Collins 2004; Davis and Luehlfing 2004; Penttila, Engels and Kivikosky 2004; Weil 2004; Angeles 2005; O'Connor 2005a, 2005b; Li and Visich 2006; Angeles 2007; Bendoly, Citurs and Konsynski 2007; Choy et al. 2007; Delen, Hardgrave and Sharda 2007; Godon and Visich 2007; Reyes and Frazier 2007; Bottani and Rizzi 2008; Cannon et al. 2008; Hozak and Collier 2008; Bi and Lin 2009.
Information sharing
Tushman and Nadler 1978; Constant, Kiesler and Sproull 1994; Gavirneni, Kapuscinski and Tayur 1999; Petersen 1999; Lee, So and Tang 2000; Premkumar 2000; Shaw 2000; Shore 2001; Sahin and Robinson 2002; Zhao, Xie and Zhang 2002; McKinnon et al. 2003; Carr and Kaynak 2007; Zhou and Benton 2007.
Human impact
Hunter, Beaumont and Sinclair 1996; Koulikoff-Souviron and Harrison 2007; Shub and Stonebraker 2009.
Psychology/Sociology
Harland 1996; Lamming et al. 2001; Chang, Polsa and Chen 2003.
Top management support
Felton and Arthur 1959; Hahn, Hambrick and Mason 1984; Webster and Frederick 1988; Kotler 1990; Watts and Kim 1990; Monczka, Trent and Callahan 1993; Tosti and Jackson 1994; Krause and Ellram 1997; Lambert and Stock 1998; Ellram, Krause 1999; Mehra, Hoffman and Sirias 2001; Chen and Paulraj 2004a; Sandberg and Abrahamsson 2010.
Supply network structure

Thorelli 1986; Helfat and Teece 1987; Harland 1996; Teng, Grover and Fietler 1996; Christiaanse and Kumar 2000; Stock, Greis and Kasarda 2000; Wouda et al. 2002; Chen and Paulraj 2004a; Vila, Martel and Beauregard 2006; Srai and Gregory 2008.

Inter-organizational relations

Bhote 1987; Carter and Miller 1989; Landeros and Monczka 1989; Helper 1991; Cooper and Ellram 1993; Stuart 1993; Helper and Sako 1995; Harland 1996; Nitschke and O'Keefe 1997; Ragatz, Handfield and Scannell 1997; Handfield, Krause and Scannell 1998; McGinnis and Vallopra 1999; Vonderembse and Tracey 1999; Carr and Smeltzer 2000; Hult et al. 2000; Cox, Sanderson and Watson 2001; Robson and Rawnsley 2001; Handfield and Bechtel 2002; Handfield and Nichols 2002; McLaren, Head and Yuan 2002; Batt 2003; Chen and Paulraj (2004b).

Intra-organizational relations

Huhtinen, Ojala and Virolainen 2002; Gowen and Tallon 2003; Singh, Lai and Cheng 2007.

Strategic purchasing

Hahn, Kim and Kim J.S. 1986; Reck and Long 1988; Cooper and Ellram 1993; Ellram and Carr 1994; Spekman and Sawhney 1995; Cox 1996; Thompson 1996; Carr and Smeltzer 1997; Anderson and Katez 1998; Babbar and Prasad 1998; Humphreys, Mak and Yeung 1998; Carr and Smeltzer 1999; Carr and Smeltzer 2000; Heriot and Kulkarni 2001; Carr and Pearson 2002; Chen, Paulraj and Lado 2004.

Outsourcing

Lankford and Parsa 1999; Hayes, Hunton and Reck 2000; Jones 2000; McCarthy and Anagnostou 2004; Jiang, Frazier and Prater 2006; Jiang and Qureshi 2006; Marzyani , Mazlan and Nita Ali 2006.

Facility location

Nozick and Turnquist 1998; Tüshaus and Wittmann 1998; Min and Melachrinoudis 1999; Simchi-Levi, Kaminsky and Simchi-Levi E. 2000; Lowe, Wendell and Hu 2002; Daskin, Snyder and Berger 2003; Wang et al. 2003; Perić, Jugović and Zelenika 2005; Shu, Teo and Shen 2005; Melo, Nickel and Saldanha-da-Gama 2006; Wang, Yao and Hunag 2007; Melo, Nickel and Saldanha-da-Gama 2009.

Operations Management

Jones and Riley 1987; Babbar and Prasad 1998; Garg 1999; Waller, Dabholkar and Gentry 2000; Power, Sohal and Rahman 2001; Stevenson 2007.

Finance Management

Delk 2000; Ellram 2000; Bhutta and Huq 2002; Farris and Hutchinson 2002.

Inventory Management

Bourland, Powell and Pyke 1996; Lee, Wang and Padmanabhan 1997; Chen et al. 2000; Donovan 2005; Ellis 2009.

Total Quality Management

Crosby 1979; Takeuchi and Quelch 1983; Carter and Miller 1989; Flynn, Schroeder and Sakakibara 1993, 1994, 1995; Adam 1994; Forker and Hershauer 1994; Kim 1994; Ahire, Golhar and Waller 1996; Forker, Mendez and Hershauer 1997; Kanji and Wong 1999; Shin, Collier and Wilson 2000; Mehra, Hoffman and Sirias 2001; Liker 2004; Lin et al. 2005; Robinson and Malhotra 2005.

Process improvement Orientation

Jones and Riley 1987; Lemon 1991; Handfield and Pannesy 1994; Levy et al. 1995; Pisano and Wheelwright 1995; Hoek 1997; Humphreys, Mak and Yeung 1998; Collins, Henchion and O'Reilly 1999; McGinnis and Vallopra 1999; McGinnis and Vallopra 2001.

Marketing/Services

Kohli and Jaworski 1990; Min and Mentzer 2000; Waller, Dabholkar and Gentry 2000; Chang, Polsa and Chen 2003; Jüttner, Baker and Christopher 2007.

Customer focus

Drucker 1985; Chernatony, Knox and Chedgay 1992; Doyle 1994; Kuglin 1998; Hoekstra, Leeflang and Wittink 1999; Christopher and Payne 2003.

Customer Responsiveness

Sparks and Fernie 1998; Jones 2002; Storey, Emberson and Reade 2005; Reichhart and Holweg 2007.

Sustainable Supply Chain

Linton, Klassen and Jayaraman 2007; Barbosa-Póvoa 2009; Teuteberg and Wittstruck 2010.

Green Supply Chain

Carter and Ellram 1998; Guide and Srivastava 1998; Gungor and Gupta 1999; Hoek 1999; Dowlatshahi 2000; Srivastava 2007; Fortes 2009; Ninlawan 2010.

Table 2: Major Domain Areas of SCM

Cost
• Operations Management (6) • Facility location (12) • Inventory Management (5) • Strategic purchasing (16) • Outsourcing (7) • Finance Management (4)
Management Structure
• Top Management Support (13) • Inter –organizational relations (22) • Intra- organizational relations (3) • Supply Network Structure (10)
Quality
• Total Quality Management (17) • Process improvement orientation (10)
Marketing
• Marketing (5) • Customer Focus (6) • Customer Responsiveness (4)
Environment
• Green Supply Chain (8) • Sustainable Supply Chain (3)
Information Technology (IT)
• Information Sharing in SCM (13) • IT Implementation (29) • E-Commerce (14) • Use of RFID (20)
Human Resource
• Human Impact (3) • Psychology/Sociology (3)

demanded by the customer are provided to them within the timelines and with appropriate quality levels.

"*Facility location*" is a critical element of supply chain which deals with choosing the most appropriate locations for opening up of business operation facilities, keeping a large number of factors in consideration. According to Simchi-Levi et al. (2000), the decisions regarding the number, location and capacities of warehouses and manufacturing plants, or the flow of material through the logistics network are strategically very important to the firms. Undoubtedly the main aim is to somehow maximize the profits and also reduce the transportation times leading to better customer responsiveness. A qualitative (natural, historical, social, technological factors) and quantitative (mathematical models) approach based decision process forms the basis of an effective location analysis (Perić, Jugović and Zelenika 2005). Some of the major factors which influence the facility locations are availability and cost of labor, state of transportation and communication network, land costs, local availability of raw materials, taxation system, environmental regulations, availability of energy resources, customer concentration etc. These location decisions are very critical to the efficiency of supply chains. Inefficient locations will result in excess costs being incurred throughout the lifetime of the facilities, leading to neutralization of benefits from optimization of other supply chain operations. (Daskin, Snyder and Berger 2003).

Inventory Management is another important aspect in cost effective supply chains. The management of supply chain

inventories across all tiers of the global supply chain is directly related to minimizing cash and improving the bottom line (Ellis 2009). An optimum inventory stock is very essential for dealing with variability in demand, market uncertainties, providing good customer service and to reduce overall costs. High volatility in the demand of goods has increased the role of inventory management. Supply Chain Inventory Strategies Benchmark Report (2004) by Aberdeen Group states that use of too old, simplistic or overly localized inventory policies has led to tied up working capital and poor customer retention in the companies. Inefficiency in forecasting, production scheduling, sales and operations planning and wrong performance metrics have led to an excess inventory in companies (Donovan 2005). Global recession has led to dramatic changes in approach towards inventory management and companies are now reviewing their inventory policies in line with the new trends.

With the growing importance of supply-chain management, purchasing has assumed an increasingly pivotal strategic role, evolving from an obscure buying function into a strategic business partner (Cooper and Ellram 1993; Ellram and Carr 1994). The choice of materials to be bought and decisions regarding their quantity and quality levels are potential for the type and quality of final products obtained. Effective procuring of input materials thus influences the supply chain effectiveness and efficiency. Right procurement choices and decisions pave the future path of a supply chain and define its long range success and corporate image. Carr and Smeltzer (1997) define strategic purchasing as a purchasing function with a formal long range plan which is regularly reviewed and consists of materials or services to be purchased. Many new factors are adding up into strategic purchasing function such as effect of improved supplier relationships, increased use of information technologies (e-purchasing), green procurements etc. Undoubtedly this element can engender sustainable competitive advantage by enabling firms to have close and long-term working relationships with a limited number of suppliers and promote open communication among supply chain partners (Chen, Paulraj and Lado 2004).

Outsourcing refers to transferring of certain operations of supply chain to some third party firms either domestically or internationally in order to take cost or technology advantages. According to the White paper on Supply Chain Operations Outsourcing (2009) by SAS and HAVI Global Solutions, Business Process Outsourcing has traditionally focused and thrived in the warehousing and logistics functions in the supply chain arena. It further explains as to how companies are taking the help of 3PL (Third party logistics) firms to carry out their distribution operations efficiently. However the domain of outsourcing is expanding and more number of operations of supply chain are being transferred to third party firms. The companies have realized the need to better concentrate only on their core operations in which they have gained expertise and better outsource other supportive operations. This approach will undoubtedly lead to quality improvement as well as cost reduction for the final products. To summarize from Lankford and Parsa (1999), outsourcing is claimed to have reduce costs, expand services and expertise, improve employee productivity and morale, and create a more positive corporate image (Marzyani, Mazlan and Nita Ali 2006).

There are large numbers of costs associated with every step in supply chain and hence to appropriately deal with them, "finance management" is very important. This element has become one of the priorities only after the global recession struck. Demica Research Report on Supply Chain finance, (2009) states that inability of physical supply chain changes to fight the economic downturn has generated a lot of interest in finance management techniques. The Aberdeen Group (2006) defines Supply Chain finance as: "A combination of Trade Financing provided by a financial institution, a third-party vendor, or a corporation itself, and a technology platform that unites trading partners and financial institutions electronically and provides the financing triggers based on the occurrence of one or several supply chain events."

3.2 Management

Management Commitment towards SC aspects is very important to successfully utilize the opportunities given by the practice of SCM.

Top Management Support occupies a special place in SCM implementation in any organization. In order to achieve the successful execution and desired results through SCM, the alignment of the organizational structure as well as the commitment of the top management are most important. Several authors (Felton and Arthur 1959; Hambrick and Mason 1984; Webster and Frederick 1988; Kotler 1990; Tosti and Jackson 1994) suggest that top management plays a critical role in shaping an organization's values, orientation and direction. Ellram, Lambert and Stock (1998) suggest that top management support, leadership and commitment to change are important antecedents to the implementation of SCM. Even introducing some new technologies and organizational changes within the

organization requires top management approval (Mehra, Hoffman and Sirias 2001). Sandberg and Abrahamsson (2010) presents six archetypes of the role of top management in SCM implementation & coordination viz., the supply chain thinker, the frame setter, the process designer, the relationship manager, the controller, and the organizer for the future. In the research of Chen and Paulraj (2004a), the construct of top management support is characterized in terms of time and resources contributed by the top management in important strategic decisions (Hahn, Watts and Kim 1990; Monczka, Trent and Callahan 1993; Krause and Ellram 1997; Krause, 1999).

A supply chain involves intensive interaction and linking up with a number of suppliers, distributors, vendors and retailers. An effective information flow along the supply chain thus necessitates the need of developing and maintaining healthy "*inter-organizational relationships*" among all the stakeholders. As global markets are becoming more competitive, complex and dynamic, many firms are building up long term relations with their suppliers to improve supply chain agility (Hult, Hurley and Giunipero 2000). The success of SCM is completely dependent on the performance and efficiency of all the contributing firms. One of the most important performance outcomes expected from improved inter organizational relationships is cycle time reduction within the supply chain (Handfield, Krause and Scannell 1998). Moreover as firms are outsourcing their operations to third party logistics (3PL), it is very important to communicate as to what is expected from these 3PL in terms of quality and other product characteristics. This is only possible by collaborating with them and working as closely knitted group. Handfield and Bechtel (2002) state that partnering occurred as firms sought to take advantage of market opportunities through a synergistic combination of strategic core competencies. This further led to identification of suppliers with the greatest potential for partnering, a process often described as "supply base optimization'' (Bhote 1987). Most of the literature on inter-organizational relationships has mentioned mainly about supplier relationships. Carter and Miller (1989) found that supplier's quality performance is much superior when the interaction and communication among buyers and suppliers goes beyond only the purchasing-sales interface. As a result of this realization among companies, the supplier contracts have increasingly become long-term and suppliers are now required to provide customer with all the information regarding their materials and processes (Helper 1991; Helper and Sako 1995). Through close relationships, supply chain partners are more willing to share risks and reward and maintain the relationship over a longer period of time (Landeros and Monczka 1989; Cooper and Ellram 1993; Stuart 1993).To foster and implement these effective relationships, IT tools can help in a big way. Chen and Paulraj (2004b) also figure out the importance of cross functional teams and logistics integration for obtaining a fruitful inter-organizational relationship.

Intra Organizational Relationship is another important contributor towards the fruitful execution of SCM in an organization. The status of this factor indicates the healthy communication and coordination among various sub units and departments within an organization. The use of information technology, and particularly the Internet & Intranet technology, has led to more efficient and effective intra- and inter-organizational information flows in SCM (Huhtinen, Ojala and Virolainen 2002). Singh, Lai and Cheng (2007) have emphasized upon the use of IT and appropriate Supply Chain Technology (SCT), RFID and ERP synchronization technology etc. to achieve effective communication within an organization for the desired functioning of supply chains.

Supply Network Structure or the configuration of supply networks has got a huge potential to provide new insights towards capabilities and performance of supply chains. The network structure is usually studied within the organizational boundaries but to focus upon SCM as network, a number of organizations have to be studied and configured. Thus overall optimization is much more important than the local optimization. The supply network encompasses the concept of an integrated network of key supply units operating along the length of supply chain (Srai and Gregory 2008). Chen and Paulraj (2004a) network firms characterize strong linkages between supply chain members with low levels of vertical integration. Srai and Gregory (2008) demonstrate new approaches to the mapping, analysis and visualization of complex supply networks in the context of configuration.

3.3 Quality

In a supply chain *Quality* oriented performance is responsibility of a raw material supplier to a product distributor. Shin, Collier and Wilson (2000); Liker (2004); Lin et al. (2005); Robinson and Malhotra (2005) have cited successful supply chain stories focused on quality. A quality focused SCM approach, known as Supply chain Quality Management (SCQM) was also introduced by Robinson and Malhotra 2005.This process involves measuring, analyzing and continually improving products, services and process. The aim is to 'create value and

achieve satisfaction of intermediate and final customers in the market place' (Robinson and Malhotra 2005).

The discussions of quality can be broadly divided into Total Quality Management (TQM) and Process Improvement.

In view of achieving competitive advantage and supply chain management excellence, a Supply chain Excellence model was developed by Kanji and Wong (1999) which includes principles of "Total Quality Management" for enrichment of supply chain performance. TQM can be viewed as an organization-wide philosophy requiring all employees at every level of an organization to focus his/her efforts to help improve each business activity of the organization (Mehra, Hoffman and Sirias 2001). The Boston University Manufacturing futures survey has consistently listed `conformance quality' as the number one concern of US manufacturing executives (Kim 1994). TQM mainly focuses on improving the material inputs, manufacturing operations and distribution functions in alignment with the customer needs and achieving goal of customer satisfaction. Among others Forker, Mendez and Hershauer (1997) have identified role of quality department; particularly its integration with SC; for achieving the ultimate goal of customer satisfaction. They further state the importance of practicing quality management at the upstream levels of a supply chain so as to minimize the excessive cost of rejections, reworks and product failure.

In the similar manner, a quality focused approach can be achieved through implementing the appropriate *Process Improvement* techniques over the entire supply chain. McGinnis and Vallopra (2001) define "Process" as "any production/operations process that used materials and supplies, capital equipment, labor, and information to convert inputs into products/services." In order to reduce the variability in products and ensure a constant standard of quality, the processes need to be continuously monitored and improved. The quality focus in a supply chain necessitates the process improvement methodologies to be applied right from the supplier end till the distribution processes of the quality product. Lemon (1991) discussed concurrent product and process development (CP/PD) as an approach to improve quality and reduce overall product costs. Pisano and Wheelwright (1995) argued that it is also necessary to develop new product and new processes along with improving the existing ones.

3.4 Marketing

According to American Marketing Association (1985), marketing is "the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods and services to create exchanges that satisfy individual and organizational goals". It is inextricably linked and is a critical element of supply chain management.

Marketing Concept consists of three main pillars: customer focus, coordinated marketing and profitability (Kohli and Jaworski, 1990). To attain the goal of customer satisfaction and higher supply chain surplus, marketing philosophy has to be integrated as a part of supply chain management. Marketing is more concerned with revenue by focusing on the demand side of the company and along with focus on efficient supply side; it determines the company's profitability (Jüttner, Baker and Christopher 2007). Min and Mentzer (2000) argue that "the marketing concept, market orientation, relationship marketing and SCM are not separate but inextricably intertwined". The literature review suggests that marketing focus is very important to create the customer value in a supply chain and provide the right products at right time, right place, right cost and in right quantities.

The *Customer Focus* is the core of marketing concept. Today supply chains have aligned all of their operations from procurement to distribution in line with customer focus. As the monopolies are coming to an end and competition amongst companies is increasing, the companies are leaving no stone unturned in providing best products which cater and many a times exceed customer tastes and expectations. This is necessary in order to increase their market shares. In the new paradigm of marketing, the supplying organization must focus its efforts upon developing an 'offer' or 'package' that will impact customers' perception of the value they derive through ownership of that offer(Christopher and Payne 2003). According to (Hoekstra, Leeflang and Wittink 1999), customer concept is a management orientation in which superior customer values are designed through good customer relations and are implemented with the help of other supply chain partners. (Drucker, 1985) states that the quality of products is not defined by supplier input but by what customer gets and is willing to pay for.

Another very important element in supply chains is the responsiveness. Normally, there exists an inverse relation between responsiveness and costs. So, the supply chains are somehow trying to achieve a balance among these two factors in order to maximize profits and also provide excellent customer service. Across industry sectors, the concept of responsiveness has been receiving increasing attention and has been advanced as one of the key themes in recent supply chain research (Reichhart and Holweg

2007). Shortened product life cycles, and the fragmentation of formerly standard products, impel a shift towards more "agile" and "customer responsive" behaviour by suppliers of goods and services (Storey, Emberson and Reade 2005). These dynamics are especially notable in the context of the fashion industry and clothing retail in general (Sparks and Fernie 1998; Jones 2002). In order to improve this element, there has been a shift towards BOT (Build to Order) type supply chains; Dell personal computers being a leading example.

3.5 Environment

Early in 1960's, industrialization was considered as only criteria to development. This led to indiscriminate destruction of environmental resources resulting into filthy surroundings and global problems of ozone layer depletion and green house effect. Gradually, it became a major concern all over the globe. For supply chains also, the current scenario has completely changed from that of 60's, as customer of today is much more aware about the global environmental concerns and understands the immediate need to save the planet. The element of "eco-friendly" products has become a part of customer values and many people are willing to pay extra for such products. Thus environmental focus is one of the foremost elements for supply chains and has given birth to a new term known as "Green Supply Chain". Global market demands and governmental pressures are pushing businesses to become more sustainable (Guide and Srivastava, 1998; Gungor and Gupta, 1999). The literature review by Fortes J. (2009) brings out green operations, green design, green manufacturing, reverse logistics and waste management as the key themes in green supply chain. According to Srivastava (2007), a green supply chain can be thought of as a supply chain that has integrated environmental thinking into all of its core operations. Today majority of firms are focusing on reducing wastes and conserving energy through increasing efficiency of various processes.

Green procurement includes cooperation with suppliers for environmental objectives, Suppliers' ISO14000 certification and reduction, reuse and recycling of materials in the process of purchasing (Ninlawan et al. 2010). Green manufacturing involves production processes which use inputs with relatively low environmental impacts and also encompasses recycling and green product design (Atlas, Florida). Similarly green distribution involves practices of green packaging and sustainable logistic practices. A new practice in this regard is that of reverse logistics. Dowlatshahi (2000); Carter and Ellram (1998) define reverse logistics as a process where a manufacturer accepts previously shipped products from the point for consumption for possible recycling and re-manufacturing.

As the debate over environmental concerns is catching up with an increasing number of world governments and social groups, the concept of *sustainable supply chains* has come to the forefront. Going in line with the definition of sustainability, the companies are expected to build up their supply chain models around social and environmental aspects. The influence and relationship among supply chain management and social and environmental business aspects needs to be considered (Barbosa-Póvoa 2009). The literature review suggests that a lot of efforts are being taken in this direction but still a lot more can be expected to come in the years to come.

3.6 Information Technology (IT)

The focus on information technology has been on the rise as companies are attempting to find ways to improve their flexibility and responsiveness. Today's information technology is permeating the supply chain at every point, transforming the way exchange-related activities are performed and the nature of the linkages between them (Palmer and Griffith 1998). In this category we have grouped four elements which relate to the need and implementation of IT in Supply Chain Management. Let us look into each of this element one by one.

Information Sharing has acquired a core position in supply chain management particularly as a component of supply chain practices such as vendor managed inventories (VMI), and collaborative planning, forecasting and replenishment (CPFR). Information sharing and collaboration with trading partners is seen as a company's top logistic challenge according to a poll of Supply & Demand Chain Executive's readers (Supply & Demand Chain Executive, 2005). With appropriately sharing information between suppliers and retailers on production decisions under demand uncertainty, both profits and customer service levels can be improved (Zhao, Xie and Zhang 2002). Moreover, information sharing in supply chain acts as a remedy to the "Bull Whip Effect" and improving supply chain effectiveness and efficiency. All these factors have led to more and more number of companies investing a huge amount of money in acquiring latest information sharing systems.

There is no denying the fact that "Information Technologies (IT)" have contributed immensely to all upstream and downstream operations of supply chain

management in recent years. It has played a key role in effectively managing the information flow along the firms and binding the supply chain partners together. According to Simchi-Levi et al. (2003) objectives of IT in SCM are:

- Providing information availability and visibility
- Enabling single point of contact of data
- Allowing decisions based on total supply chain information

Common terms for business models using IT are e-commerce and e-business – the former relating commonly to web-based sales, and the latter to a more holistic use of IT (Auramo, Kauremaa and Tanskanen 2005). According to Gunasekaran and Ngai (2004), top management support along with business process reengineering, quality function deployment, concurrent engineering and project management approach are means to implement IT in a company.

Dramatic economic and strategic changes brought about by recent advances in technology, including the Internet, the World Wide Web (WWW), broadband, mobile and wireless technologies, have expanded the scope of commerce (Lancioni, Schau and Smith 2003). All this has given rise to the concept of *"e-commerce"* which basically involves the selling and buying of the products through these new technologies. It has shown an immense potential in improving the supply chain efficiency in a big way especially by reducing the time involved in commerce operations and also reducing the huge amount of paperwork involved in such activities. Moreover the new platforms have helped to expand these activities from local markets to global domain. Electronic commerce is changing the competitive environment in a number of ways, by reshaping buyer-supplier relationships, improving core business processes, providing electronic intermediation, reaching new segments and markets. (McIvor, Humphreys and Huang 2000)

Radio Frequency Identification (RFID) has received increased attention from practitioners and academics in recent years. This technology had undoubtedly contributed in the efficient tracking of products throughout the supply chain, leading to reduced inventories and better customer responsiveness.

3.7 Human Resource

As the number of supply chain operations and complexity involved is increasing, there has been an urgent need to focus on human resource management. According to Shub and Stonebraker (2009), due to a new technology explosion, the priorities of firms may focus toward keeping up with technology rather than addressing the human resource strategies, leading to poor functioning of supply chains. The human element is a very important element of supply chain in order to attain various logistic goals efficiently and effectively. Employers and workers in a supply chain form the basic fabric of all the operations and their motivation and alignment with the goals of organization are very much essential for success of business. This is further dependent on how well they are managed and treated. The strength of human resource and organization strategies and their alignment with the supply chain configuration notably reduces the potential for lost opportunities and risks of underperformance (Hunter, Beaumont and Sinclair 1996).

The human resource management practices are being applied both within firms and also across their other supply chain partners. The latter can take the form of firms requiring that their supply chain partners adopt certain HR best practices in order to facilitate better relations among the firms. (Koulikoff-Souviron and Harrison 2007).

4. SCM: ROAD AHEAD

A classification of all the papers reviewed in this research is also done on time horizon with a time period of 5 years. The table 3 gives values of relative percentages given to a particular domain area of SCM in a specified time period.

For a particular five year period, the percentages (P_i) for various domains have been calculated as:-

Relative percentage (Pi) = $N_i / (\sum Ni) * 100$

where :

i varies from 1 to 7.

N_i = number of papers of i^{th} domain during a particular period

The success of Supply Chain Management is dependent primarily on coordination and trust between supply chain partners. Technology and other factors may only help us in improving performance of supply chain. When the concept of SCM started getting popularized, the big issue was to understand that now firms are not competing with firms rather a complete chain is competing with another chain. In fact, a network is competing with another network. The trend seen in table 3 also supports the idea that initial research focus was on management structure

Table 3: Historical Developments in SCM

Time Period	Cost (P1)	Management Structure (P2)	Quality (P3)	Marketing (P4)	Environment (P5)	Information Technology (P6)	Human Resource (P7)	Total Papers (∑ Ni)
Upto-1990	14%	45%	18%	9%	0	14%	0	22
1991-1995	10%	21%	34%	7%	0	28%	0	29
1996-2000	25%	16%	9%	6%	6%	36%	2%	91
2001-2005	23%	23%	9%	7%	0	34%	4%	56
2006-2010	23%	11%	0	6%	17%	37%	6%	35

which dealt with broadening the horizon of thought process and developing relationships among supply chain partners.

Later on, when other factors like globalization and research and development in the field of IT started taking place, the focus shifted on delivery of quality and use of IT for improved responsiveness, sharing of information and better security. This trend kept on going for next 20 years but from 2000 onwards, the importance of cost effective supply chain has also grown up. Also, with the current scenario of global business environment, we find a substantial amount of research and development taking place with respect to environmental aspect of Supply Chain which may include ecological environment, social environment and economic environment as well.

With the help of this transformation process over last three decades, we can certainly project the future roadmap of SCM which should be Customer Centric and will be supported by Technological Development and Environmental Concerns. The proposed interaction between these elements can be viewed in the Figure 1.

A top management commitment and mutual trust among all the partners of a supply chain is very necessary.

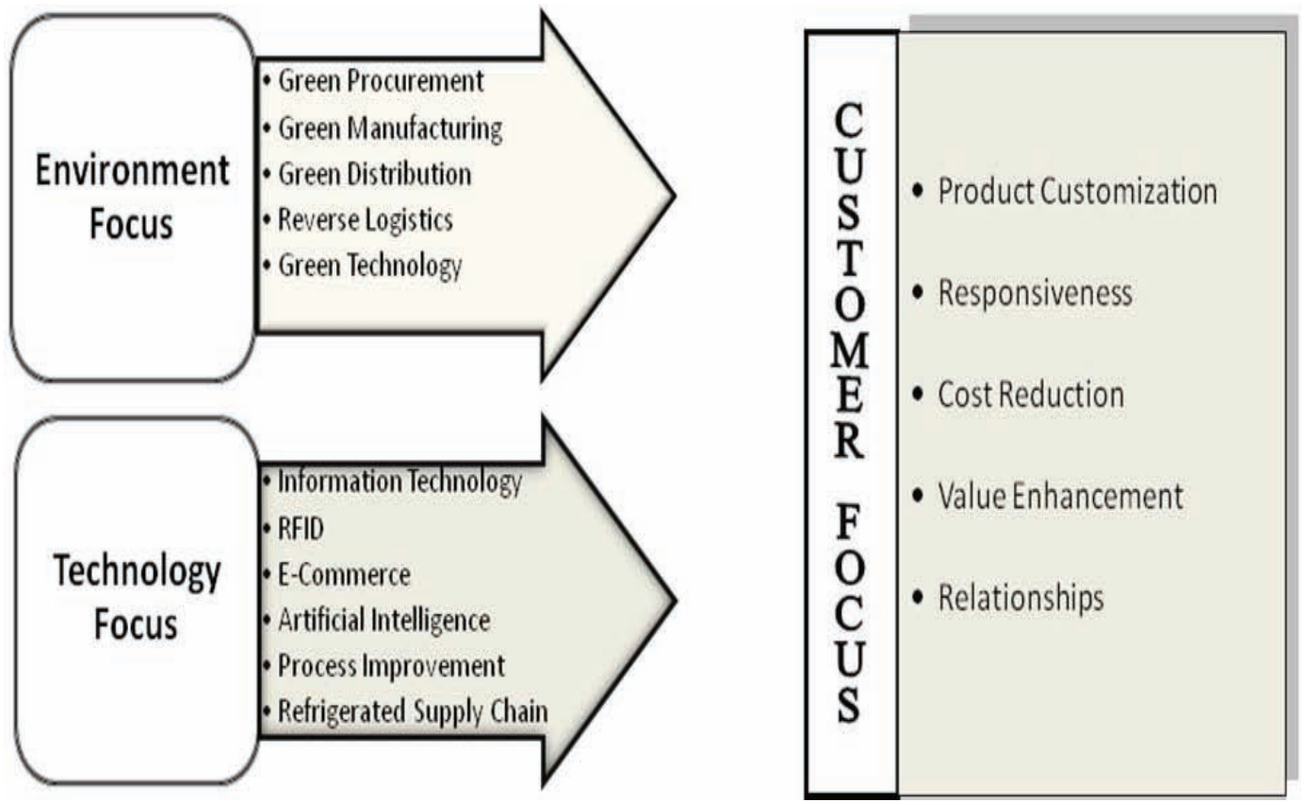
4.1 Customer Focus

In the years to come, customer focus will play a central role in supply chain management. All the other focus areas i.e. technology focus and environmental focus will support customer focus. Keeping in mind the specific needs of customers the supply chains will aim for mass customization. Customers will have more freedom and flexibility in terms of configuring the product as per their own taste and requirement. Moreover increasing competition in the market will pressurize the supply chains to further minimize their delivery times & maximize responsiveness. As organizations will try to reach out customers globally, they will try to bring in and collaborate with Regional firms leading to a much extended and complex Supply Chain Management. In Order to improve the profits the focus will be on expanding the customer base through cost reduction and value enhancement. This would require the supply chains to be more efficient and cut down on non value added activities. Customer relationships would acquire more importance as companies will aim for retaining the customers through improved participation in their business. In short the customer will acquire the key role and would be a guiding factor in each and operation of Supply Chain Management.

4.2 Technology Focus

Technology which is the back bone for supply chain management is advancing to much higher levels every day. The practice of Supply chain management will have to welcome the newer & faster, more efficient technological changes so as to improve upon their efficiency and responsiveness. Technologies like RFID will gain more popularity along with increased usage of internet as well as intranet for managing the supply chains globally. Companies apart from using technology in manufacturing sector will also use latest technology in Sales & Marketing sector. They may go for innovative marketing through widely used social websites. To ensure the availability of the product at right time and right place the companies will follow lean practices & Inventory management practices eliminating the bullwhip effect completely. Tracking the product throughout its life would gain huge importance and for that companies will

Figure 1: SCM: Road Ahead



start focusing upon latest tracking & coding technologies. To eliminate the undesired variability the companies will go for an increased number of machines minimizing the human interface. Even for attaining an effective interlinking among the partner firms, organizations will go for the use of latest advances in the field of information & communication technology. Finally as the R& D phase in any operation or process needs most efficient resources, the companies will highly enrich these practices through adopting the latest technology available in future. It can be said that the companies will have to be at par with the technology to utilize the supply chain management in the best of the best manner.

4.3 Environment Focus

There has been an increasing concern regarding environmental degradation throughout the world governments. These concerns will further grow leading to introduction of new environmental norms and regulations related to business practices. Undoubtedly this factor will greatly influence the supply chain management in future. Moreover due to more and more of media attention, the environmental awareness among customers will increase and hence customers will prefer eco-friendly products in future pressurizing supply chains to introduce policies such as green procurement, green manufacturing, green distribution and reverse logistics at large scale. Future research will focus on developing environment friendly technologies at a lower cost with more efficiency leading to a more sustainable development.

5. CONCLUSION

Supply Chain Management evolved basically from collaborative inventory management problem at various nodes of distribution channels. Over period of time, different tools like collaborative forecasting and algorithms of transportation problem helped in developing the scope of better coordination among various channel partners. Later, IT became a very important catalyst in the development of Supply Chain Management research and practices worldwide. IT helped networks to deliver products to the customers with efficiency and responsiveness and also gather valuable information and funds. At the same time, developments in the field of marketing and other related functional aspects of management have agreed that future of business will revolve around the custom-

er. The supply chain management practices will also be responding to this development by keeping customer at the driving seat of all developments, which will be supported by technological and environmental issues to be cost effective(lean and green) and at the same time more responsive (shorter lead time high service level etc.). So far these objectives are considered to be at an extreme position on a supply chain strategy but future will demand both of them. So, a good SCM will take a lot of inputs from the areas of Operations Management and Marketing Management so that the objective of customer satisfaction and the efficient and responsive supply chain can be achieved simultaneously.

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