

# A Study of Evolution and Future of Supply Chain Management with Agile Supply chains

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## Abstract:

**Supply Chain Management is a methodology of improving the business processes, making them more resilient, more agile and as a result, more competitive. Agile supply chains optimize goals and satisfies the constraints. The main function of SCM is to improve the product or service competitiveness ( (Machowiak, W. (2012). This paper is an endeavour to study, understand and interpret the evolution of supply chain management. On the basis of systematic literature review, we have attempted to explore the future of Supply Chain. We have captured various definitions of SCM provided by experts from the initial to recent period along with major classical definitions. Various dimensions of Supply chain are an integral part of this study. The paper discusses SCM and its dimensions; and tries to delineate SCM from related areas like Logistics Management, Value Chain Management and Operations Management. Getting the right product in the right quantity, in the right condition at the right place, at the right time to the right customer at the right price. The paper also elaborates various theories of SCM. On completion of thorough literature review, the paper ends with a conclusion and future scope of work.**

**Keywords: Supply Chain, Supply Chain Evolution, Supply Chain Theories, Future Dimensions of Supply Chain.**

## Introduction

A supply chain deals with the conversion of raw materials into finished goods and timely delivery of the products to end users (Mabert and Venkataramanan, 1998). This paper first describes the evolution of various definitions of supply chain. Supply Chain Management basically looks into the interrelationship and inter- linkages between various functions, processes and chain members and analyses the impact of their interaction on value additions and profit maximization (Ballou, 2007). We next elaborate certain research questions such as understanding SCM and its dimensions, delineating SCM from other related areas and identifying various contributions in SCM theories. We have further tried to analyse and identify research gap.

## Research Questions

RQ1: To understand evolution of SCM and its dimensions.

RQ2: To delineate SCM from other related areas like Logistics Management, Value Chain Management, and Operations Management.

RQ3: To identify various contributions in the field of SCM theories. SCM connects different departments, from demand management, sourcing and procurement management, and manufacturing management to logistics management.

SCM process is made up of different parties i.e. retailer, manufacturer, and supplier involved in providing products and services to the customers, and the sole purpose is to add value in their products, both in upstream and downstream, through some channel with the proper flow of information and resources. In this fast paced business, it is imperative to have proper flow of information within this physical network which can be fully leveraged through business integration. This business integration will help in coordinating between different parties to achieve the bottom line results. In Fact many companies have begun to identify that today competition occurs between supply chain networks rather than individual firms (Li et al., 2005; Koh et al., 2007; Chow et al., 2008).

## 2. Evolution and Definitions of SCM

The scope and definition of supply chain management has been ever changing. The meaning of the word supply chain management in industry parlance is not the same that it was 20 years ago. It is continuously evolving and broadening its scope. Here, we have tried to identify the trend in the evolution of SCM by reviewing papers in chronological orders. Reviewing papers in chronological order will show the trend in evolution of definition of SCM.

References : Definitions Chang et al. Supply chain management now has a new strategic dimension to it which is e-procurement.

Dubey and Ali Supply Chain Management may be defined as the management of upstream and downstream associations with vendors and customers to provide better customer value at least cost to the supply chain.

Machowiak SCM is a methodology of improving the business processes, making them more resilient, more agile and as a result, more competitive. The main function of SCM is to improve the product or service competitiveness.

Randall and Supply Chain Management incorporates supply and demand management inside and Mello (2012) across companies.

Supply Chain Management as a concept manages the flow of material, information and funds end to end i.e. from upstream to downstream members. It also deals with the (2012) disposal of material after consumption as per the environmental norms. SCM tries to achieve this at the lowest cost with maximum efficiency.

The definition that “SCM is primarily responsible for managing the buying as well as Melnyk et al. managing the flow of orders and information” is no longer valid. Today all the related aspects such as improving customer service, mitigating supply chain risk, reducing wastes, improving new product design process and enhancing product service quality are treated as an integral part of supply chain management.

In India, supply chain cost can be divided in two main categories: a) Distribution cost: which is generally logistics cost Dubey (2009) b) Inventory value and inventory holding costs: which mainly consist of cost of Inventory and cost of keeping inventory in storage location Wadhwa et al. The challenge of SCM is to identify and implement strategies that minimize cost while(2008) maximizing flexibility in an increasingly competitive and complex market. Supply chain tries to optimize goals and sustain competitiveness. Vachon and Supply chain management is increasing its dimensions. Being efficient is not enough; Klassen (2007) Companies are now looking for sustainable and environmental friendly supply chain.

SCM should not be studied alone and its interest should not be only industrial Sachan and development. Concepts such as market orientation, relationship marketing should be Datta (2005) studied with SCM. There is a need of new boundaries of SCM which can incorporate all these concepts into SCM. Supply chain management is not only limited to logistics activities and planning and

Chen and control of materials and information flow internally within the company or externally between companies. It also deals with the strategic decisions such as inter-organizational Paulraj (2004) issues, alternative organizational form to vertical integration. It is also the management of relationship between suppliers and customers. Supply Chain Management involves processes which help a firm to improve its competencies by synchronising operations to include source, make and deliver processes(2002) in collaboration with channel partners and suppliers.

Skojett-Larsen SCM can be seen from many perspectives such as system engineering, economics,(1999) sociology and management.

Walton and Supply chain management is the integration of various concepts such as extended enterprise, the virtual organization, the virtual value chain and green supply chain. Gupta (1999) These aspects are important from the perspective of strategy and operations for an industry.

Spekman et al. Supply Chain Management attempts to ensure that the expertise of any member of supply chain shared throughout the supply chain. By sharing the expertise, a firm will be able to improve on customer value as well as gain competitive advantage in the market. Supply chain management integrates two business functions, it manages immediate relationships with suppliers, and it also integrates chain of supplier's and a Harland 1996 customer's customer and so on. It is the management of interconnected business involved in the ultimate provision of products and service packages required by end users. According to Lee a supply chain is a network of facilities that performs the function of procurement of material to intermediate and finished products, and distribution of finished products to (1993) customers.

### 3. Research Methodology

In order to answer the research questions, the literature review method is used. Our research paper tries to identify the trends in evolution of SCM. There are various definitions and theories of SCM which have changed rapidly with time. We have reviewed a lot of research papers and have made an attempt to study the various definitions of SCM in chronological order.

Various research papers from databases like Emerald, Science Direct and EBSCO were identified and referred to. Within these databases, various journals such as International Journal of Logistics Management, International Journal of Information Management, International Journal of Physical Distribution and Logistics Management, Journal of Operations Management, Supply Chain Management: An International Journal, International Journal of Operations and Production Management etc. were referred to by us.

The following methodology for the literature review process has been adopted

1. Identification of Areas: Based on the research questions, we were able to identify the particular areas in which we were supposed to find literature.
2. Searches in Various Databases: After finalizing the areas for literature review, we utilized various databases such as Ebsco, Emerald etc. to find the relevant research papers.
3. Sorting the Literature for Review: Once the research papers were available, the papers based on the relevance of those papers with respect to the research questions were sorted out.
4. Performing Review: The sorted papers were then reviewed in an attempt to answer the research questions.

Visual Representation of the Process:

#### 4. Dimensions of Supply Chain Management

After studying various papers, we were able to identify 3 major supply chain dimensions:

##### 4.1 Long Term Relationship

The key signs of long term relationship in supply chain management are trust and communication (Heidi and John, 1990). Long term relationships have been identified as a very important dimension of SCM in various literatures (Min and Mentzer, 2004). The main idea behind maintaining a long term relationship in a supply chain is to complement each other's strengths and to develop synergies to improve the total gains (Carr and Pearson, 1999). Organisations should be all the time aware of the long term relationships between them and other firms. Long term relationship really helps an organisation by sharing their knowledge with others and learning from others experience and knowledge (Griffith, Harvey, and Lusch, 2006).

#### 4.2 Concurrent Engineering

It is essentially the collaboration of all the stakeholders of a supply chain i.e. suppliers, and customers at an early stage (Celtek and Kaynak, 1999). All the stakeholders are included in the decision making from the design stage so that there are no miscommunications regarding any aspect of design and engineering. All the work which might have dependencies with other stakeholders is done by making cross functional teams and involving all the stakeholders in the process of designing the product or process.

#### 4.3 Strategic Purchasing

In today's era, purchasing is replaced by strategic purchasing. The profits are generated not from the customers but from the vendors or suppliers. Hence purchasing is becoming more and more strategic now. Identifying the vendor is also a part of strategic purchasing. Strategic purchasing always takes a long term view in mind while taking any decision. The purchasing strategy should be well aligned with the firm's strategic goals.

#### 5. Organizational Theories in Supply Chain Management

There is a need to understand these theories that act as pillars of foundation in supply chain. There has been research regarding these underlying elements (Ketchen Jr. and Giunipero, 2004 and Ketchen and Hult, 2006). These theories will be employed in understanding the traditional view point of SCM and how it has evolved over time.

##### 5.1 Resource-Based View

Resource-based View (RBV) is considered as most dominant dimension in supply chain management. These resources are rare, valuable and difficult to purchase. Such resource provides competitive advantage over the competitors who lack in such resources (Barney, 1991). Competitive advantage is generally considered as the implementation of strategies not currently being implemented by other firms that facilitates reduction of costs, exploiting market opportunities, and neutralization of competitive threats. Appropriate deployment of resources results in competitive advantage.

##### 5.2 Knowledge-Based Theory

Knowledge-based view provides insight in terms of coordination of supply chains. A traditional organisation largely relies on the hierarchy for coordination. Normal philosophy of supply chain lacks in formal hierarchy. They largely depend on knowledge to facilitate for concerted actions. Generally, most of the supply chains in formal mechanisms are for storing vital knowledge (information) in an organisation (Grant, 1996).

##### 5.3 Agency Theory

Agency theory suggests that the firm can be viewed as loosely defined between resource holders. An agency relation arises when multiple individuals hire other individuals (agents) to perform some tasks and authorize them with decision-making. Both the parties get very different targets, normally the agent possesses higher target than that of the principal (Eisenhardt, 1989). Agency expenses are incurred to hire agents in order to sustain an effective agency relationship.

##### 5.4 Institutional Theory

Institutional theory is largely depended upon the external pressures or forces for shaping of organisational choices. It emphasizes on definite supply chain practices to some firms. It provides guidance to managers and employees to understand success of other organisations and to apply appropriate possible actions (DiMaggio and Powell, 1983).

##### 5.5 Transaction Cost Analysis

This theory provides a standard approach to ascertain the limits within which a firm should operate efficiently (Williamson, 1975, 1985, 1996). TCA can be used to provide an incentive for the firms to enter into collaboration with other organisations. By using this theory, we can ascertain which functions are to be performed within the organisation and which functions are to be outsourced. Whenever a firm outsources a function, the firm to which it has outsourced becomes the partner of the parent firm. Thus the transaction costs also depend upon the behaviour of the partner when it discovers some opportunity. The way to reduce these risks due to uncertain behaviour of the partner is by entering in long term contracts with the partner, having penalty clauses and making joint investments.

This theory is generally used in taking the crucial decision i.e. whether to manufacture a product or to outsource its manufacturing (Maltz, 1993; Andersson, 1997; Halldorsson, 2002). Thus essentially TCA helps in deciding whether a particular operation should be performed in-house (within the organisational limits) or to be outsourced (outside the organisational limits).

##### 5.6 The Network Theory

In today's competitive era, the performance of a firm does not depend only on its direct partners and indirect partners. Hence, the way in which a firm interacts with other firm becomes significantly important in this era. The way the firm interacts with other

firms decides the formation of a new resource. Thus the two firms combine together to develop synergies and to learn from each other's strengths. The network theory provides an understanding of the importance of relationship between two organisations, whether it is build-up of trust or long term relationships or using of each other's systems and processes.

The relationship between two firms in a network is enhanced by two kinds of processes i.e. the exchange process wherein the two firms exchange information, goods, services etc. while the other is adaptation process where the two firms learn and adapt to each other's processes such as legal, administrative logistics etc. (Johanson and Mattsson, 1987).

## 6. Delineating SCM from other Related Areas

Supply Chain has been defined in various ways which is described in the tabular format adopted above. Many times terms such as Logistics, Value Chain in specific context and Operations Management are used interchangeably. This is in fact the reason to dwell upon these terms where the debate and similarities as well as dissimilarities are studied and discussed further.

### 6.1 Resolving Debate between Logistics and SCM

Logistics management is about planning, implementing the forward-reverse flow and storage of goods with related information between source and destination. The ultimate aim is to meet customers' demands.

“Logistics Management involves inbound and outbound logistics, warehousing, materials handling, demand fulfilment, network design and inventory management. Logistics Management encapsulates activities with other functions including marketing, operations, finance and information technology.”

Supply Chain Management, on the other hand is about integration of supply and demand management within and across all functions in any organization.

Logistics can be called as a specialized part of SCM. In SCM, there exist five major key functions: procure, make, move, store and service. Logistics is viewed as the movement of products from source to destination. It is involved at various stages of a supply chain; from supplier to plants, from plants to distribution centres, from distributions centres to stores, from stores to customers, or any of these combinations.

In light of global competitiveness, logistics management might include packaging, third-party integration and procurement, technology and customer service.

### 6.2 Resolving Debate between Value Chain and SCM

Supply chain and value chain have been debated time and again. We already know that SCM refers to handling the transformation of raw materials into products, also called as finished goods. It monitors all those activities which involve various supply chain partners right from supplier to end user. We are also aware of value chain, which as a concept was promoted by Michael Porter, in his seminal work on “Competitive Advantage”. Porter defined value as the amount buyers are willing to pay for what a firm provides, and he conceived the “value chain” as the combination of nine generic value added activities operating within a firm – activities that work together to provide value to customers (Porter, 1985). Value chain and supply chain can be considered as complementary to each other. On one hand, supply chain looks after the flow of products and services, whereas on the other hand, value chain looks after meeting customer demands and cash flows. Both the chains involve the same elements and partners. These supply chain partners are interdependent on each other. One of the important differences between them is that the focal point is not the same for the two. Supply chain focuses on upstream activities starting from supplier to manufacturer to distributor and finally to customer. It majorly looks after the processes at manufacturer's end, waste reduction, improvement of productivity and efficiency, and other related activities. Value chain focuses on downstream activities, which creates value to the customers. It majorly looks after customer satisfaction, on time delivery, demand fulfilment and other related activities. This difference is somewhat blurred in various research works. Over the years, the concept of value chain has evolved, and now it can be said that a value chain operates in both the directions. It adds value in the eyes of both supplier as well as customer. The former derives value from payments whereas the latter derives value from quality in products and services that are delivered. Another difference between value chain and supply chain can be that supply chain focuses on reduction in costs and achievement of strategic goals, whereas value chain focuses more on research and development, marketing, after sales services, return on investments, return on assets and profitability. Overall, it can be said that value chain is for a firm and supply chain is for an industry. Current scenario demands that supply chain and value chain shouldn't be considered as different entities. In today's competitive world, it is required that all elements of supply chain should be fully integrated and information flow should be instantaneous. To continue a debate between these two concepts may create a lacuna in our existing system. All organizations should work towards their integration in order to achieve business excellence.

### 6.3 Resolving Debate between SCM and Operations Management (OM)

In most companies, supply chain management is considered as a part of operations management. But there is one difference between the two. The former is external as well as internal whereas the latter is only internal. The tasks under operations management involve making of products according to the specifications, proper packaging, selling to the right retailers and

marketing successfully. The operations management looks after forecasting sales, improvement of productivity, increased responsiveness, demand fulfilment and maintaining quality standards.

Operations management includes a larger set of activities that includes SCM and is engaged with controlling every phase of the processes used to manufacture the products. SCM gets material in and out of the factory whereas OM refers to what you do with the material inside the factory.

#### 6.4 Similarities and Dissimilarities between SCM, VC and OM

Supply chain management and Operations management are two terms which are closely related to each other. In organizations, these are often confused by managers. Both the concepts have several similarities and overlapping of concept, but there are differences that separate two of them.

Broadly, we can say that Supply Chain management is the management of things outside the company whereas Operations management deals within the company. However, both the terms are really close and dependent. Generally SCM is seen as a subset of OM. SCM deals with controlling and monitoring of purchasing of raw material equipments, that are required for manufacturing of products. OM deals with the bigger set of activities including SCM.

Similar relationship is shared between logistics and supply chain management. Supply chain management is an overall management of material which includes procurement of raw material to delivery of end product to the end user. Supply chain management can be defined as design, planning execution, control and monitoring of supply chain activities. On the contrary, logistics deal mainly with the flow of goods from point of production to point of consumption.

If we compare supply chain management with the total quality management, we can say that ultimate goal of both of them is to achieve customer satisfaction. Though the origin point of both of them is different but they are evolving along similar paths. Both of them come into the picture to fulfil the need of tactical strategies for operations. TQM is the management philosophy, “that encourages cost reduction, the creation of high quality goods and services, customer satisfaction, employee empowerment, and the measurement of results” (Gunasekaran and McGaughey, 2003, p. 361) whereas, SCM is the management philosophy which manages total flow of material through various channels from producer to the ultimate customer.

#### 7. Conclusion, Unique Contribution and Further Research Directions

The objective of the paper was to study SCM, its evolution and dimensions. This paper was based on three research questions which were:

RQ1: To understand evolution of SCM and its dimensions.

RQ2: To delineate SCM from other related areas like Logistics Management, Value Chain Management, and Operations Management.

RQ3: To identify various contributions in the field of SCM theories.

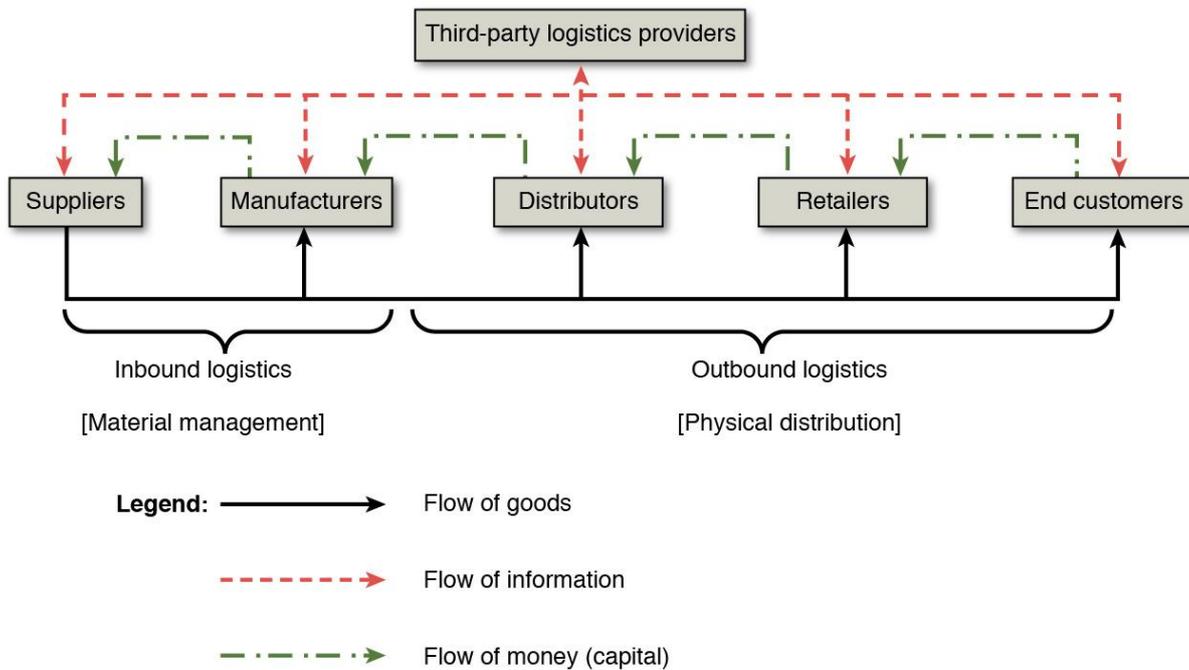
After reviewing papers pertaining to SCM and Operations Management, we were able to map the evolution of Supply Chain Management as a concept and the results are represented in a tabular form. We were able to identify the most important dimensions of SCM namely Long Term Relationship, Concurrent Engineering and Strategic Purchasing.

We were able to identify a thin line that separates various terminologies such as SCM, Value Chain, Operations Management and Logistics Management. After reviewing several papers on these topics, we were able to delineate SCM from other related areas.

During the passage of time, various theories of SCM have evolved and were widely accepted in the industry. We have studied various papers for the theories and elaborated these theories in the paper.

##### 7.1 Unique Contribution

Framework of Evolution of SCM across the years along with its future dimensions is the unique contribution of this paper. The diagram below is an attempt to visually depict the evolution of SCM from 1960s to present. As we can see from the diagram that the scope of SCM has been steadily increasing, we expect it to encompass many more activities in the future. As per the diagram, SCM as of today is inclusive of all the concepts such as logistics, operations, physical distribution etc.



## 7.2 Further Research Directions

Through this study, a number of interesting results were revealed that require further research. A further case-based exploration approach should be carried out to better understand the evolution of SCM in an organization. Another area that requires further exploration includes the investigation of management's role in implementation of successful SCM practices. Also, the use of information systems and technologies to support SCM is an emerging area for future research. There is also vast scope in the area of security issues in Supply Chain Management with specific reference to Big Data.

### Security issues in Big Data

Big data security is a constant concern because Big Data deployments are valuable targets to would-be intruders. A single ransomware attack might leave your big data deployment subject to ransom demands. Even worse an unauthorized user may gain access to your big data to siphon off and sell valuable information.

### Security issues in Supply Chain

**“Endpoints are remote computing devices that communicate back and forth with corporate networks that they are connected to.”**

Supply chain management experts recommend strict control of an institutions supply network in order to prevent potential damage from cyber criminals. Ransomware is a form of malware designed to encrypt files on a device, rendering any files and systems that rely on them unusable.

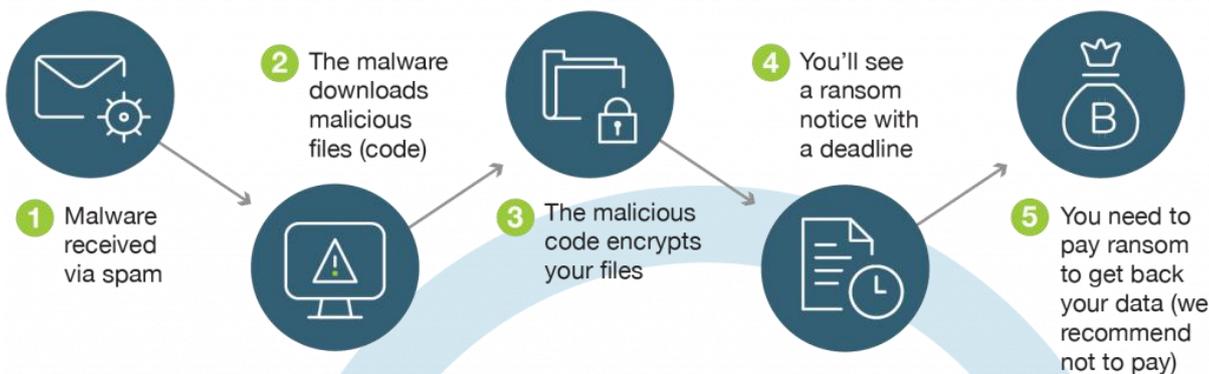
Malicious actors then demand ransom in exchange for decryption.

Other security issues in Supply chains are

**Application-layer flood** :- In this attack type an attacker simply floods the service with requests from a spoofed IP address in an attempt to slow or crash the service.

Distributed denial of Service attack is an attack meant to shutdown a machine or network making it inaccessible to its intended users.

# How Ransomware Works



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