Chapter –2

Concepts and History of Supply Chain Management Practices

2.1 Introduction:
In the current competitive scenario supply chain management assumes a significant importance and calls for serious research attention, as companies are challenged with finding ways to meet ever-rising customer expectations at a manageable cost. Supply chains encompass the companies and the business activities needed to design, make, deliver, and use a product or service. Businesses depend on their supply chains to provide them with what they need to survive and thrive. Every business fits into one or more supply chains and has a role to play in each of them. To succeed in the competitive markets that make up today’s economy, companies must learn to align their supply chains with the demands of the markets they serve. Supply chain performance is now a distinct competitive advantage for companies who excel in this area.

Definitions:
Christopher (1998) defined the supply chain as the 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.

Chopra and meindl (2001) “A supply chain consists of all stages involved, directly or indirectly, in fulfilling a customer request”.

Handfield & Nichols (1999) “A supply chain encompasses all activities associated with the flow and transformation of goods from the raw material stage, through to the end user, as well as the associated information flows”.

A supply chain may be defined as an integrated process wherein a number of various business entities like
a) Suppliers
b) Manufacturers
c) distributors and
d) Dealers, Retailers etc.,
work together in an effort to:

(1) Acquire raw materials
(2) Convert these raw materials into specified final products, and
(3) Deliver these final products to retailers.

Recently, however, there has been increasing attention placed on the performance, design, and analysis of the supply chain as a whole. From a practical standpoint, the supply chain concept arose from a number of changes in the manufacturing environment, including the rising costs of manufacturing, the shrinking resources of manufacturing bases, shortened product life cycles, the leveling of the playing field within manufacturing, and the globalization of market economies. The current interest has sought to extend the traditional supply chain to include reverse logistics, to include product recovery for the purposes of recycling, re-manufacturing, and re-use. Within manufacturing research, the supply chain concept grew largely out of two-stage multi-echelon inventory models, and it is important to note that considerable progress has been made in the design and analysis of two-echelon systems. (Benita M. Beamon)

2.2 History of Supply Chain Management:

The History of Supply Chain Management can be studied under different eras. Table 2.1 Era in the Evolution of Supply Chain Management.

| Table 2.1: the Evolution of Supply Chain Management |
|-----------------------------------------------|--------------------------------------------------|
| 1  Creation Era | The term supply chain management was first coined by an American industry consultant in the early 1980s. However the concept of supply chain in management, was of great importance long before in the early 20th century |
| 2  Integration Era | This era of supply chain management studies was highlighted with the development of Electronic Data Interchange (EDI) systems in the 1960s and developed through the 1990s by the introduction of Enterprise Resource Planning (ERP) systems. |
| 3  Globalization Era This | This era is characterized by the globalization of supply chain management in organizations with the |
## Specialization Era

### Phase One

**Outsourced Manufacturing and Distribution**

In the 1990s industries began to focus on “core competencies” and adopted a specialization model. Companies abandoned vertical integration, sold off non-core operations, and outsourced those functions to other companies.

### Phase Two

**Supply Chain Management as a Service**

Specialization within the supply chain began in the 1980s with the inception of transportation brokerages, warehouse management, and non asset based carriers and has matured beyond transportation and logistics into aspects of supply planning, collaboration, execution and performance management.

### Supply Chain Management 2.0 (SCM 2.0)

Web 2.0 is defined as a trend in the use of the World Wide Web that is meant to increase creativity, information sharing, and collaboration among users.

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### 2.3 Supply Chain Management – An Industry strategy & Technology

Rhonda R. Lummus, Robert J. Vokurka(1999), The definitions described and developed earlier and recent industry collaborative activities indicate that supply chain management is not a standalone process. Many supply chain efforts have fallen short of the potential advantages because the term is often viewed as only relating to the supply
side of the business or to the purchasing function. As indicated above, supply chain management is much more than just procurement. Among the misunderstanding evidenced, supply chain management is not:

- Inventory management;
- Logistics management;
- Supplier partnerships;
- Driven from the supply side;
- A shipping strategy;
- Distribution management;
- The logistics pipeline;
- Procurement management;
- A computer system.

Despite the acceptance of the concept of managing the supply chain and partly due to the limiting misunderstandings, growth of integrated supply chain management has been slow. Reasons for the slow growth of integrated supply chain management include the following:

- Lack of guidelines for creating alliances with supply chain partners.
- Failure to develop measures for monitoring alliances.
- Inability to broaden the supply chain vision beyond procurement or product distribution to encompass larger business processes.
- Inability to integrate the company's internal procedures.
- Lack of trust inside and outside a company.
- Organizational resistance to the concept.
- Lack of buy-in by top managers.
- Lack of integrated information systems and electronic commerce linking firms.

2.3.1 Linking the supply chain to the business strategy

The supply chain improvements described indicate that supply chain management has the potential to improve a firm's competitiveness. Supply chain capability is as important to a company's overall strategy as overall product strategy. Supply chain
management encourages management of processes across departments. By linking supply chain objectives to company strategy, decisions can be made between competing demands on the supply chain. Improvements in performance are driven by externally-based targets rather than by internal department objectives. Managing the supply chain means managing across traditional functional areas in the company and managing interactions external to the company with both suppliers and customers. This cross-boundary nature of management supports incorporating supply chain goals and capabilities in the strategic plan of the company. This focus on integration can then lead to using the supply chain to obtain a sustainable competitive advantage over competitors.

The impact of managing overall product demand and the supply of product will impact the profitability of the company. The supply chain strategy can be viewed as the pattern of decisions related to sourcing product, capacity planning, conversion of finished product, deployment of finished product, demand management and communication, and delivery. Linking supply chain strategy to the business strategy involves defining the key business processes involved in producing a company's product or service. Rhonda R. Lummus, Robert J. Vokurka (1999),

A company must develop objectives for the management of the supply chain based on corporate objectives. From these higher level objectives, a set of detailed objectives can be developed for each process within the supply chain. This cascading method serves to integrate the supply chain processes with the overall enterprise direction and provides measures for monitoring and execution. Supply chain management can be utilized to be a point of differentiation for a company. Excellence on a certain dimension in product position can provide a competitive marketing opportunity, but shortfalls in providing this dimension by the supply chain can eliminate this advantage. For a company to be competitive, it is not enough just to vary marketing programs. They must define a working relationship with customers and put themselves in a position to deliver customer value. All components of the supply chain must have the capability to meet strategic objectives.
Companies must evaluate the effectiveness of the supply chain strategy using a new set of measures. Typical rewards aimed at improving performance of functions or departments must be revised to strive to improve supply chain performance overall. By tying the supply chain strategy to the overall company strategy, the objectives become process objectives rather than functional objectives.

For example, traditionally, one of purchasing measurements is material cost or material variance. Buying product at a lower cost is one way to improve that measure. Purchasing a carton at a lower cost from a new vendor might lower the cost of the carton. However, the new carton may not run as efficiently through the production process as the one from the original supplier. Purchasing measure of material variance is favorable, but the manufacturing facility is recognizing added costs in downtime, maintenance, etc. Measurements must be designed to look across the supply chain and become process objectives. The internal structure of the supply chain which often is causing as much confusion/cost as external portions of the chain included in that process.

### 2.4 Collaborative Supply Chain

Supply chain collaboration is often defined as two or more companies working together to create a competitive advantage and higher profits that cannot be achieved by acting alone (Simatupang and Sridharan 2005). The close cooperation among partners engaged in joint efforts to effectively meet and customer demands with lower costs is the major concern. The advent of supply chain collaboration creates the need, at the inter-organization level, to pay special attention to the understanding of collaboration in order to prepare the partners to create collaborative efforts successfully (Lambert et al. 2004).

Figure 1 shows a simple structure of collaborative SC with two players that serve the same consumer. The consumer can be included in the collaborative system if he takes a greater participatory role in the making and delivering of a product. The following properties are inherent in a SC: the retailer has decision rights (e.g. end customer demand) and internal costs and revenue. The supplier also has its own decision rights
(e.g. delivery and production setting), private information (e.g. product characteristics) and internal costs and revenue.

1.4.1 Dilemma of supply chain collaboration

When partners involve in collaboration, there is a dilemma between accommodating decisions that take into account the interest of the supply chain as a whole and preserving decisions in the interest of an individual enterprises. A conflict resolution diagram can be employed to capture and describe the dilemma of supply chain collaboration between taking decisions based on link-centric-measures and taking decisions based on supply chain-wide measures. As shown in figure 2.1, Goldratt (1944) and Dettmer (1998) explain that the diagram dilemma can be read: „taking decisions in the interest of the supply chain (P1) is in direct conflict with taking decisions in the interests of individual company (P2). Frequently, individual enterprises tend to make decisions in the interests of their individual enterprises rather than considering the holistic supply chain.

The first key assumption is that the partners often think that supply chain collaboration means a decrease in bargaining power to minimize costs. They presume that minimizing costs of each partner of the supply chain will improve the performance of the whole supply chain. Often, each individual company focuses its decisions to maximize myopic revenue (i.e. sales from immediate downstream partners) and minimize myopic costs (i.e. buying from immediate upstream partners) rather than to maximize the overall market expansion of the entire SC. See Goldratt (1944) and Dettmer (1998) for further explanation on the conflict resolution diagram.
Table 2.1. A Dilemma of Supply Chain Collaboration (Goldratt, 1994)

<table>
<thead>
<tr>
<th>Objective</th>
<th>Requirements</th>
<th>Prerequisite</th>
</tr>
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<tbody>
<tr>
<td>Maximize the benefit of supply chain collaboration (O)</td>
<td>Maximize the revenue of the supply chain from Sales to end customers (R₁)</td>
<td>Base decisions on supply chain-wide measures</td>
</tr>
<tr>
<td></td>
<td>Protect the profitability of the individual member (R₂)</td>
<td>Base decisions on link-centric measures</td>
</tr>
</tbody>
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In order to minimize the effect of the dilemma of SC collaboration, a more consistent definition of this concept must be developed, defining the various attributes and their interaction. In 2004, Simatupang and Sridharan proposed such a definition and characterized supply chain collaboration using five elements, as shown in figure 3, which include appropriate performance system, information sharing, decision synchronization, incentive alignment and streamlined inter-enterprises business processes.

Figure 2.1 An Empirical Study of SC Collaboration
2.4.2 Collaborative strategies

Different collaborative strategies such as QR, ECR, VMI, or CPFR have been proposed. While the primary concept and philosophy are seemed to be common, the difference between these strategies is not always obvious, this section will provide a brief description of these strategies.

**Quick response (QR)**

Under this strategy, suppliers receive point of sale data from retailers and use this information to synchronize their production and inventory control with actual sales. The retailer makes decisions to generate orders. Using point of sale data, the supplier makes decisions to improve demand forecasting and production scheduling (Schonberger 1996).

**Efficient consumer response (ECR)**

ECR strategy aimed at making the SC more competitive and bringing greater value to the consumer. Manufacturers, wholesalers and retailers work together as business allies to reduce total system costs, inventories and physical assets while improving the consumers’ choice of high-quality, fresh products.

**Continuous replenishment policy (CRP)**

CRP strategy reorganizes the traditional system of ordering and replenishment characterized by the transfer of purchase orders from the distributor to the supplier. CRP is a process of restocking where the producer sends to the distribution centre full loads whose composition varies according to sales and in conformity with a prearranged level of stock. In an advanced form of CRP, suppliers may gradually decrease inventory levels at the retail store or distribution centre while the service levels are satisfied.

**Vendor managed inventory (VMI)**

It represents the highest level of partnership where the vendor is the primary decision-maker in order placement and inventory control. Under a VMI system, the supplier decides on the appropriate inventory levels of each of the products (within
previously agreed upon bounds) and the appropriate inventory policies to maintain these levels.

2.4.3 Collaborative planning, forecasting and replenishment (CPFR)

CPFR, introduced by the voluntary inter-industry commerce standards (VICS) association, began first with a pilot program between Wal-Mart and Warner-Lambert, called CFAR (collaborative forecasting and replenishment). CPFR is a set of business processes that are established and empowered by a formal agreement to cooperate on strategy, tactics and execution by resolution of exceptions. Figure 4 depicts nine steps of CPFR process.

![Figure 2.3. The Nine Steps of CPFR Process (Hammond and Larry, 2001)](image)

However, the basics of CPFR are straightforward: first, the partners share information about demand. If the buyer is a manufacturer or assembler then demand is generated by the manufacturer or assemblers trial master-production schedule. Then significant differences between the buyers and sellers demand forecast, labeled exceptions are
discussed and resolved. These are steps 3-5 above. Then, buyer and supplier share plans for orders that the buyer will place with the supplier, based on the shared demand forecasts. Again, exceptions are identified and resolved (steps 6-8). Subsequently, using the shared order plan, actual orders are generated (step 9). The foundation for steps 3-9 is the so-called „front-end agreement”, under which the roles of the buyer and supplier and their capabilities to perform these roles are assessed. In this step, targeted performance and measures are also adopted. In step 2, strategies and tactics are specified in detail.

2.5 The Impact of Supply Chain Management on Performance

The literature of SCM was born on its practical positive impact on firm performance. Early research used to report anecdotal evidence about firms that had adopted the supply chain management approach and how this resulted in benefits for the firm and other supply chain members. Great part of this literature was descriptive, reporting practices of successful companies.

The aim of a supply chain is to keep materials flowing from source to end-customer (Harrison and Hoek, 2005). Good flow of material ensures products are delivered to end customers on time or on schedule. Childer house, Lewis, Naim and Towill (2003) found that management of a smooth material flow is a key factor in achieving superior supply chain performance. A successful logistics network can reduce entire supply chain costs, including manufacturing and procurement costs, inventory handling costs, facility costs (fixed costs), labour cost and transportation costs (Simchi-Levi, Kaminisky and Simchi-Levi, 2000).

Corporate culture is another compelling factor for SCM successfulness. Organisational shared values in terms of extreme trust, commitment and collaboration, organisational capability and top management supports are essential for an effective SCM (Mello and Stank, 2005). Tony and Kelvin (2007) suggested that human factor is significantly affecting the SCM effectiveness. The human factors affect management of various stage and process in a supply chain as employees are the key asset to drive supply chain performance.
Additionally, measurement is very important and is the only approach to understand whether process performance is improving or worsening and whether correction action is needed urgently (Roussel and Cohen, 2005). Metric in performance measurement is a number for measuring and reporting a key performance indicator for business, department, team, product line and individual. Performance measurements metrics could be customer satisfaction, product quality, delivery precision and cost reduction.

It is important to measure performance because it (Thoo Ai-Chin 2010):

- provides required direction and helps in setting priorities
- gauges and monitors progress
- focuses on key issues
- identifies areas acquiring attention for groups and individuals
- helps to communicate key issues and results
- measures and rewards people and teams

2.6 Importance of Supply Chain Management:

Supply Chain Management is a process of linking raw material transformation to the ultimate product to be consumed by the consumer. It contributes in adding value to it with support of various functions in making it efficient and effective in operations. It ultimately results in reduction of cost, wastages, improves quality etc. Supply Chain is witnessing changes due to globalization shift in customer demand pattern, shorter product life cycle, proliferation of product variety, demand driven than push, time based competition etc. This complex environment has a constant threat of aligning internal and external partners in supply chain management which indeed is a challenge.

The manufacture–supplier relationship represents a building block that can easily be extended throughout the supply chain. Thus, a more general definition of supplier satisfaction in the supply chain is “a feeling of equity with the supply chain relationship no matter what power imbalances exists between the buyer–seller relationship.”
2.7 Indian Scenario

Globalisation, Liberalisation and steady economic growth have mainly driven a vast change in India. Logistics and supply chain management in India has been receiving greater attention in the last few years, with India’s GDP recording high growths. This is not only because of vast opportunities, but also because the growth of logistics infrastructure has not kept pace with broader economic growth and warrants much needed consideration.

2.7.1 Growth Drivers

Acceleration in industrial production and increased consumption has resulted in high demand for basic and specialized logistics management, at local and cross-border levels. With cumulative foreign direct investment (FDI) – equity inflows from April 2000 to October 2011 valuing US$ 226.05 billion, according to the Department of Industrial Policy and Promotion (DIPP) – there has been a major thrust on industrial production. As a result of population growth, the demand from expanding upper-middle and middle classes for basic products and services is rocketing.

According to a Cushman & Wakefield report, India’s logistics industry is expected to grow at 15-20% per annum, reaching revenues of US$ 385 billion by 2015. Demand for focused supply chain services has been fuelled by industries with a high propensity to outsource: including the automobile, consumer packaged goods, hi-tech, telecom and retail industries. The movement of basic commodities, for domestic consumption and export/import, has led to an increase in multimodal and bulk transportation and the emergence of many new ports and port-related service providers.

2.7.2 Structure and Issues

India currently spends 12-13% of its GDP on logistics. For sectors moving physical goods, this percentage is much higher as 55% of the country’s GDP is generated by the service sector. The industry as a whole is very fragmented and disorganized; large companies account for a small portion of the domestic transportation market share. In India, 57% of freight ton-kms move on the road network (see Figure 2.4). This heavy dependence on a single mode, which is inefficient and has high carbon intensity, is
brought about by deficiencies in the government-controlled railways. The rail system cannot meet the needs of industry. Indian Railways subsidizes passenger transport from freight revenue and has not invested adequately in new capacity.

![Figure 2.4. Freight mode share1 (percentage of ton-km)](image)

Source: Outlook on the Logistics & Supply Chain Industry 2012 June 2012 World Economic Forum report

2.8 Global Scenario:

In the early days, the supply chain management was referred to the functions of logistics, transportation, purchasing and supplies. However, the evolution of the supply chain management has moved to focus on integration, visibility, cycle time reduction and streamlined channels. The new integration which are self explanatory has a variety of activities that include:

- Integrated Purchasing Strategy
- Supplier Integration
- Supply Base Management
- Supply Chain Management
2.8.1 Global supply chain network:

According to study, four important characteristics define companies that succeed in developing global supply chain network to manage total supply chain cost.

**Corporate global Vision:** Does the organization create an effective global vision as a primary driver for investing resources and effort in seeking global supplier and customers? Without an ideal vision of what the organization is attempting to accomplish, managers at different locations throughout the world have difficulty in coordinating business unit strategies and functional goals. As organizations seek to expand their global operations, an effective vision serves as a primary force for developing a global supply base.

**Management Structure & Systems:** Best-in-class companies have invested in enabling structures and systems to deploy their global vision. These enablers include the Global community councils and reporting systems to facilitate communication among the indifferent business units, International procurement officers (IPO) and sales officers with contacts in Government agencies to promote sharing of expertise and knowledge regarding traditional sourcing/sales opportunities. Improved total cost models for decision making and Global information system capable of providing sourcing and demand information to global production design sites.

**Configuring the global supply base:** As organizations set up production units in new regions, they often discover that some mix of local and global suppliers in optimal. However, the mix may change as they gain experience with local suppliers.

**Supplier development:** In the organization deploying resources to ensure that suppliers capabilities are aligned with competitive and manufacturing strategies? Supplier development approaches varies in different regions according to specific type of problem encountered. Although developing a global supply chain strategy requires a fundamental shift in the way one thinks about doing business, one of the drivers for making decision has to lie in understanding the total cost of ownership across the entire Global supply
chain. By understanding the cost drivers that underlie total cost, managers can implement strategically designed to reduce these cost.

2.8.2 Effect of Global competitiveness:-
Operations and logistics are forced to adapt to environment. The logistic framework is forced to integrate its activities to meet the challenges of an integrated economy.

  a) Geographical Integration:-
  Geographical boundaries are losing their importance. Companies view their network of worldwide facilities as a single entity. Implementing worldwide sourcing, establishing production sites on each continent and selling in multiple markets all imply the existence of an operations and logistics approach designed with more than national considerations in mind.

  b) Functional Integration:-
  The world is moving at such a fast pace that the various functional activities are no longer sequential and compartmentalized. The responsibilities of the logistics and operations manager is not limited to coordinating the physical flows relating to production distribution, or after sales service; they are also responsible for functions such as research, development and marketing. This functional integration improves flow management considerably.

  C) Sectorial Integration:-
  In traditional supply chains, suppliers, manufacturers, distributors and customers each work to optimize their own logistics and operations. They acted in isolation concerned only with their part of the flow system which resulted in creating problems and inefficiencies for other players in the channel hampering the smooth flow all of which add cost to the total system. Leading firms, realizing this situation, are beginning to extend their view beyond their corporate boundaries and work cooperatively with all channel parties in an effort to optimize the entire system. This cross boundary cooperation is referred to as Sectorial Integration.
2.8.3 Risks in Global competitiveness:-

With the advent of more global supply chains, supply side risk have become greater concern – particularly those that affect lead-time and cost.

*Lead time Risk*- This increases, in the global supply chain because there are more potential constraints that could slow a shipment at any point of its journey. Throughput at the origin or destination port may decreases, rails back ups or cargo inspection may increase because of an increased terrorist threat level.

*Cost Risk*- cost risk increases for several reasons first, the input to transportation might spike at any movement, resulting higher freight rates. As sourcing decision that was once appealing may become less so as fuel cost increases and total landed cost rise. Cost may increase due to forced mode shifting. This is new reality facing companies engage in global competitiveness today.

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