<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>PARTICULARS</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Basics of Supply Chain Management</td>
<td>41</td>
</tr>
<tr>
<td>2.2</td>
<td>History of Supply Chain Management</td>
<td>42</td>
</tr>
<tr>
<td>2.2.1</td>
<td>Before 1960’s: M.R.P.I</td>
<td>42</td>
</tr>
<tr>
<td>2.2.2</td>
<td>1960’s to 1980’s: M.R.P.I, II and ERP</td>
<td>43</td>
</tr>
<tr>
<td>2.2.3</td>
<td>Post – 1980’s: SCM</td>
<td>43</td>
</tr>
<tr>
<td>2.3</td>
<td>Developments in Supply Chain Management</td>
<td>44</td>
</tr>
<tr>
<td>2.3.1</td>
<td>Creation Era</td>
<td>44</td>
</tr>
<tr>
<td>2.3.2</td>
<td>Integration Era</td>
<td>44</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Globalization Era</td>
<td>44</td>
</tr>
<tr>
<td>2.3.4</td>
<td>Specialization Era-Phase I: Outsourced Manufacturing and Distribution</td>
<td>45</td>
</tr>
<tr>
<td>2.3.5</td>
<td>Specialization Era-Phase II: Supply Chain Management as a Service</td>
<td>45</td>
</tr>
<tr>
<td>2.4</td>
<td>Supply Chain Management Perspective</td>
<td>45</td>
</tr>
<tr>
<td>2.4.1</td>
<td>Flexible Organisation</td>
<td>46</td>
</tr>
<tr>
<td>2.4.2</td>
<td>Organisational Relationship</td>
<td>46</td>
</tr>
<tr>
<td>2.4.3</td>
<td>Total Supply Chain Coordination</td>
<td>47</td>
</tr>
<tr>
<td>2.4.4</td>
<td>Improved Communications</td>
<td>47</td>
</tr>
<tr>
<td>2.4.5</td>
<td>Outsourcing Non-Core Competencies</td>
<td>48</td>
</tr>
<tr>
<td>2.4.6</td>
<td>Build to order Manufacturing Strategy</td>
<td>48</td>
</tr>
<tr>
<td>2.4.7</td>
<td>Inventory Management</td>
<td>48</td>
</tr>
<tr>
<td>2.4.8</td>
<td>Cost Control</td>
<td>49</td>
</tr>
<tr>
<td>2.5</td>
<td>Benefits of Supply Chain Management</td>
<td>49</td>
</tr>
<tr>
<td>2.6</td>
<td>Role of Quality Models on SCM</td>
<td>51</td>
</tr>
<tr>
<td>2.7</td>
<td>SCM in Theory and Practice: a Transient Trend or Essential Change</td>
<td>52</td>
</tr>
<tr>
<td>2.8</td>
<td>A Manufacturing Supply Chain Network</td>
<td>54</td>
</tr>
<tr>
<td>2.8.1</td>
<td>Goals</td>
<td>54</td>
</tr>
<tr>
<td>2.8.2</td>
<td>Objectives</td>
<td>54</td>
</tr>
<tr>
<td>2.8.3</td>
<td>Modelling Principles and Approaches</td>
<td>55</td>
</tr>
<tr>
<td>2.8.4</td>
<td>Developing Coordinated Strategies</td>
<td>56</td>
</tr>
<tr>
<td>2.8.5</td>
<td>Implementation</td>
<td>56</td>
</tr>
</tbody>
</table>
PARTICULARS

2.9 Supply Chain Practices across the World
  2.9.1 SCM Practices in Australia and New Zealand
  2.9.2 SCM Practices in USA
  2.9.3 SCM Practices in Germany
  2.9.4 SCM Practices in China

2.10 Strategic Factors for SCM approach
  2.10.1 Building Customer-Supplier Relationship
  2.10.2 Implementing Information and Communication Technology
  2.10.3 Re-Engineering Material Flows
  2.10.4 Creating Corporate Cultures
  2.10.5 Identifying Performance Measurements

2.11 Decision areas in SCM

2.12 Role of Logistics in Supply Chain Management
  2.12.1 Inbound Logistics
  2.12.2 Processing Logistics
  2.12.3 Outgoing Logistics
  2.12.4 Physical Logistics

2.13 Supply Chain Management Activities/Functions
  2.13.1 Strategic
  2.13.2 Tactical
  2.13.3 Operational

2.14 Supply Chain Business Process Integration
  2.14.1 Supply Chain Sustainability
  2.14.2 Stages/Components of Supply Chain

2.15 Key issues in Supply Chain Management
  2.15.1 Strategic Level
  2.15.2 Tactical Level
  2.15.3 Operational Level
<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>PARTICULARS</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.16</td>
<td>Examples of Organizations Practicing SCM</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>2.16.1 Global</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>2.16.1 Indian</td>
<td>74</td>
</tr>
<tr>
<td>2.17</td>
<td>Outsourcing Widely to Focus on Core Competencies</td>
<td>75</td>
</tr>
<tr>
<td>2.18</td>
<td>Total quality management (TQM)</td>
<td>76</td>
</tr>
<tr>
<td>2.19</td>
<td>Supply Chain Quality Management Based on TQM Principles</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>2.19.1 Customer Focus</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>2.19.2 Leadership</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>2.19.3 Involvement of People</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>2.19.4 Process Management</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>2.19.5 System Management</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>2.19.6 Continual Improvement</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>2.19.7 Mutually Beneficial Supplier Relationships</td>
<td>80</td>
</tr>
<tr>
<td>2.20</td>
<td>Factual approach of Decision Making</td>
<td>81</td>
</tr>
<tr>
<td>2.21</td>
<td>Supply Chain Integration</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>2.21.1 Internal Participation</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>2.21.2 External Partnership</td>
<td>83</td>
</tr>
<tr>
<td>2.22</td>
<td>Supply Chain Operations Reference Model [SCOR]</td>
<td>83</td>
</tr>
<tr>
<td>2.23</td>
<td>Implementing Effective Supply Chain Management Strategies</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>2.23.1 Manage Inventory Investment in the Chain</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>2.23.2 Establish Supplier Relationship</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>2.23.3 Increase Customer Responsiveness</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>2.23.4 Build a Competitive Advantage for the Channel</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>2.23.5 Introduce SCM Solutions and Enabling Information Technology</td>
<td>88</td>
</tr>
<tr>
<td>2.24</td>
<td>Strategies for Solving the Supply Chain Problems</td>
<td>88</td>
</tr>
<tr>
<td>2.25</td>
<td>Latest Developments in Supply Chain</td>
<td>91</td>
</tr>
<tr>
<td>2.26</td>
<td>Business Challenges in Twenty-First Century</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>2.26.1 Understanding Customers</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>2.26.2 Managing Time Compression</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>2.26.3 Mastering Mass Customization</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>2.26.4 Undertaking Globalization</td>
<td>93</td>
</tr>
<tr>
<td>2.27</td>
<td>Organizational Commitment and Governance for Supply Chain Success</td>
<td>93</td>
</tr>
<tr>
<td>2.28</td>
<td>Partner Advisory Councils</td>
<td>94</td>
</tr>
<tr>
<td>SR. NO.</td>
<td>PARTICULARS</td>
<td>PAGE NO.</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>2.29</td>
<td>Senior-Level Supply Chain Executive</td>
<td>95</td>
</tr>
<tr>
<td>2.30</td>
<td>Attractiveness</td>
<td>96</td>
</tr>
<tr>
<td>2.31</td>
<td>Supply Chain Collaboration</td>
<td>97</td>
</tr>
<tr>
<td>2.31.1</td>
<td>Manufacturer/Supplier Collaboration</td>
<td>98</td>
</tr>
<tr>
<td>2.31.2</td>
<td>Manufacturer/Customer Collaboration</td>
<td>98</td>
</tr>
</tbody>
</table>
CHAPTER 2

LITERATURE REVIEW

Nowadays competition among companies is becoming keen and no longer between companies and companies, but supply chains to supply chains [Christopher, 1992]. In order to enhance their competitive edge, companies must continuously strive to seek defensive and offensive approaches so as to increase their better realization of organizational goals such as enhanced competitiveness, better customer care and increased profitability. From the 1960s to the 1990s, companies placed their emphasis on customer loyalty. Later, the focus was shifted to producing high quality products at reasonable costs. After words developing of variety of products to meet different needs of customer became a priority. In the 1990s, companies started discovering the impact of suppliers was of enormous significant to customers. Delivering products to customers at the right time, at the right place, and at the price has become a new challenge rather than producing only high quality products. The supply chain management approach has thus being increasingly identified by many organizations as an opportunity to achieve these goals.

2.1 Basics of Supply Chain Management [SCM]

The organizations that make up the supply chain are “linked” together through physical flows and information flows. Physical flows involve the transformation, movement, and storage of goods and materials. They are the most visible piece of the supply chain. But just as important are information flows. Information flows allow the various supply chain partners to coordinate their long-term plans, and to control the day-to-day flow of goods and material up and down the supply chain.

The concept of Supply Chain Management is based on two core ideas. The first is that practically every product that reaches an end user represents the cumulative effort of multiple organizations. These organizations are referred to collectively as the supply chain.

The second idea is that while supply chains have existed for a long time, most organizations have only paid attention to what was happening within their “four walls.” Few businesses understood, much less managed, the entire chain of activities
that ultimately delivered products to the final customer. The result was disjointed and often ineffective supply chains.

Supply chain management, then, is the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage. It represents a conscious effort by the supply chain firms to develop and run supply chains in the most effective & efficient ways possible. Supply chain activities cover everything from product development, sourcing, production, and logistics, as well as the information systems needed to coordinate these activities.

2.2 History of Supply Chain Management

Since the Industrial Revolution, companies have grappled with how they can exploit their competitive advantage to increase their markets and their profits. The model for most of the 20th century was a large integrated company that can “own, manage, and directly control” its assets. In the 1950s and 1960s, the rallying cry was diversification to broaden corporate bases and take advantage of economies of scale. By diversifying, companies expected to protect profits, even though expansion required multiple layers of management. Subsequently, organizations attempting to compete globally in the 1970s and 1980s were handicapped by a lack of agility that resulted from bloated management structures.

Long back SCM has evolved globally in USA and some of the European countries along with India. The major phases through which the present SCM evolved are as per following:

2.2.1 Before 1960’s: M.R.P.I

Managements of manufacturing of organization realized that out of the total cost of a product, approximately 60% to 70% is materials cost. Any reduction in materials cost directly contributed to the profitability. Materials Requirement Planning [MRPI] to precisely plan purchase and storing of input materials based on sales forecast / orders position, controlling inventory to the minimum possible levels in tune with the production schedule has been widely adapted. Many organizations, including in India, could achieve great reduction in inventory levels, reducing liquidity and other financial problems, increasing profitability. Materials managers have become key-members of top management team.
2.2.2 1960’s to 1980’s: M.R.P. I, II and ERP

With increasing competition and rising customer demands, controlling purely material procurement and storing cost were not sufficient to reduce product cost. Manufacturing Resource Planning [MRPII] identified additionally precise requirement of materials and process-stock at every stage of manufacture in direct relation to the customer-orders combining purchasing and manufacturing effectively. Enterprise Resource Planning [ERP] based on advances in information technology has provided a dynamic online system to guide the managers for the integration suppliers, purchasing, manufacturing and marketing across the entire organization [enterprise]. It could coordinate and provide decision-support to optimize all functions including Finance and Human Resources [Employees] to achieve overall efficiency cost reduction and better service to customers. Software vendors like SAP, ORACLE, and BAAN have contributed to improve the performance of large organization with high product variety and dispersed / complicated multi-level activities.

2.2.3 Post – 1980’s: SCM

ERP is able to provide decision support system to managers integrating the activities within the organization / enterprise. Due to the increasing levels of business activities, many agencies / supporters are involved in it from outside the organization. Suppliers / vendors of raw materials, components, transporters, and retailers etc who are not the members of the organization have critical role in fulfilling the customer’s needs. Thus, need is felt to have a system which comprises of both members within and outside the organization to work together and collaborate to provide best overall performance. Every organization or firm that contributes to the main enterprise is given the status of “Partners”, who will share the risk as well as prosperity / profit / growth with the main enterprises. The external agencies are not treated as mere “Suppliers” or “Sub-Contractors” but business-partners, with clearly defined projects sharing practices. Thus, any order or changes in the Customer’s requirement is conveyed in “real time”, “on-line” to all the partners involved so that they all know their role / action to be taken and work in collaboration, even though they may have conflicting business interest. This concept is termed “Supply Chain Management” which has gained immense popularity across the world.
2.3 Developments in Supply Chain Management

Six major movements can be observed in the evolution of supply chain management studies:

2.3.1 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, especially by the creation of the assembly line. The characteristics of this era of supply chain management include the need for large scale changes, re-engineering, downsizing driven by cost reduction programs, and widespread attention to the Japanese practice of management.

2.3.2 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. This era has continued to develop into the 21st century with the expansion of internet-based collaborative systems. This era of SC evolution is characterized by both increasing value-added and cost reduction through integration.

2.3.3 Globalization Era

The third movement of supply chain management development, globalization era, can be characterized by the attention towards global systems of supplier relations and the expansion of supply chain over national boundaries and into other continents. Although the use of global sources in the supply chain of organizations can be traced back several decades [e.g., in the oil industry], it was not until the late 1980s that a considerable number of organizations started to integrate global sources into their core business. This era is characterized by the globalization of supply chain management in organizations with the goal of increasing their competitive advantage, value-adding, and reducing costs through global sourcing.
2.3.4 Specialization Era - Phase I: 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. This changed management requirements by extending the supply chain well beyond the four walls and distributing management across specialized supply chain partnerships.

2.3.5 Specialization Era - Phase II: Supply Chain Management as a Service

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

Outsourced technology hosting for supply chain solutions debuted in the late 1990s and has taken root in transportation and collaboration categories most dominantly. This has progressed from the Application Service Provider [ASP] model from approximately 1998 through 2003 to the On-Demand model from approximately 2003-2006 to the Software as a Service [SaaS] model we are currently focused on today.

2.4 Supply Chain Management Perspective

SCM perspective suggests the boundaries of SCM include not only logistics but also all other functions within a firm and within a supply chain to create customer value and satisfaction.

Supply Chain Management as a management perspective has the following characteristics:

1) A systems approach to viewing the channel as a whole, and to managing the total flow of goods inventory from the supplier to the ultimate customer.

2) A strategic orientation toward cooperative efforts to synchronize and converge intrafirm and interfirm operational and strategic, capabilities into a unified whole,

3) A customer focus to create unique and individualized sources of customer value, leading to customer satisfaction
To balance customers' demands with the need for profitable growth, many firms have moved aggressively to improve supply chain management [AMR, 1995; Andersen et al., 1997; Copacino, 1997; Poirier and Reiter, 1996]. Their channel integration efforts have focused on the following main issues:

1) organizational structures and associated relationships;

2) supply chain coordination;

3) inter-and intra-enterprise communication;

4) sourcing;

5) manufacturing orientation;

6) Inventory and cost management.

We describe each of these issues next as per following:

2.4.1 Flexible Organizations

An important attribute for any supplier is agility realized through its flexible organization. A flexible organization of a firm supports plant and distribution networks by achieving operational efficiency through quick line changeovers, as well as savings realized as a result of avoiding back hauling and enhanced product realization.

As firms move toward supply chain excellence, they are concerned with both internal and external efficiencies. Internal efficiency, the key driving force to supply chain operational efficiency, is agility, rather than economies of size. Investments in plant and distribution equipment are important to maintain an agile organization in a supply chain. Externally, supplier efficiency is extremely critical to supply chain performance.

2.4.2 Organizational Relationships

Strategic alliances and partnerships are crucial to the success of a supply chain. Firms are encouraged to focus their attention on the entire supply chain and reduce the number of suppliers that they have to deal with. Many firms have developed preferred
supplier programs as well as core transport carriers to ensure that a quality product is received where and when it is needed.

A successful strategic alliance or a partnership must be based on extreme trust, loyalty, positive sum game [a win-win relationship], cross-functional teams, sharing common goals and cooperation that includes willingness to assist, and positive negotiations based on fairness.

2.4.3 Total Supply Chain Coordination

Each firm may have multiple supply chains and each of these may have potentially different business needs. It is important to employ cross-channel co-ordination when sharing some of the common resources among different supply chains. This co-ordination allows supply chains in a company to integrate with each other [Francett, 1996; Fraser, 1997; Gould, 1998; Harlend and Scharlacken, 1997].

Creating supply chain value is important for successful co-ordination. The most important single factor in creating supply chain value is the ability to predict or forecast demand. The goal for total coordination is to be demand driven and not lot size driven. This implies that suppliers should supply products according to demand and not lot quotas.

In the past, forecasting was done primarily utilizing historical data. Firms are moving away from this method and beginning to use point of sale data, which tell them exactly how much, was purchased during a certain time frame [Davis, 1993; Fisher et al., 1994; Fraser, 1998].

2.4.4 Improved Communications

Both uncertainty and inventory levels are lowered through improved communications “within and between” supply chain constituents. A successful customer vendor relationship is built by exchanging information pertaining to product development for new products, product improvements, costs, demand schedules [including point of sale data], and materials and supplies needed to meet production schedules.

It is crucial to relay information about end-use consumers to manufacturers back through the chain. This results in better product information about customers' needs and improved production operations.
2.4.5 Outsourcing Non-Core Competencies

Outsourcing will continue to be important for having a cost-effective business [Poirier and Reiter, 1996]. Such arrangements place responsibility for logistics or production functions in the supply chain in the hands of the constituent most capable of performing these successfully. Many firms are currently outsourcing the distribution process. They are able to track all deliveries through a third party provider.

2.4.6 Build to Order Manufacturing Strategy

The economics of build-to-order [BTO] manufacturing strategy transcends industry segments. In the March 1998 issue of Fortune magazine, it was reported that Ford is migrating to a build-to-order strategy. Their goal was to meet a majority of demand for cars using this manufacturing strategy by the end of 1999. In 1996, the delivery period for a Mustang car from the plant to a dealer was 50 days. Currently, it is only 15 days. A BTO manufacturing strategy and aggressive profit and loss management enabled Dell Computers to minimize its working capital requirements, increase cash flow, and realize a negative five days cash-to-cash conversion cycle.

2.4.7 Inventory Management

In the past, carrying inventory in stock was a normal business practice to guard against risk of unfulfilled demand. Today, many firms find that holding inventory is costly and so they try to push inventory on to someone else in the supply chain. It is a challenge for constituents to ascertain where inventory should be held in the supply chain. Some firms are demanding that the manufacturer deliver inventory to private customer warehouses more frequently and in smaller lots.

Some important supply chain inventory issues are: shorter delivery times, just in time [JIT], point of sale data, vendor-managed inventory, and consignment inventory [Mayer, 1996]. Shorter delivery times, JIT, and point of sale data are complementary to one another. For example, in order to utilize a JIT system, shorter delivery times are needed and point-of-sale data are required to know which products are to be replenished quickly. Information sharing is critical in resolving these issues. Vendor-managed and consignment inventory are becoming important management strategies designed to locate inventory in the supply chain efficiently.
2.4.8 Cost Control

Supply chain management must be able to quantify a bottom line impact. There is a tendency to accept short-term profits as opposed to long-term investments for sustained profits and growth.

It is typical in many firms that the operation function desires improved product forecasts and longer lead times. On the other hand, the sales and marketing function desires more inventories to alleviate the potential for stock-out. These demands lead to enhanced production capacity, thus creating excess inventory and consequently higher production costs. Both functions blame this phenomenon on the current process. These activities pull efforts away from doing the basics well, which include sharing information among functions and concentrating on demand management.

Issues 1 to 4 have potential impact on the enterprise at the macro level, while 5 to 8 can affect it at the micro level. Channel integration for an enterprise is best achieved when macro and micro level issues are resolved in a coordinated manner. It requires integration of generic strategies at the macro level with functional strategies at the micro level. This phenomenon is described next with the help of the acceleration principle, a strategy often utilized for solving supply chain problems.

2.5 Benefits of Supply Chain Management

Supply chain management (SCM) is the management of all activities in the production process. From the raw material stage till the company has the final finished product in hand, it needs SCM strategies. Its main aim is to deliver utmost customer satisfaction by using the least possible resources. All companies use SCM techniques irrespective of their scale of operations and sizes. There are manifold benefits as per following from using SCM effectively.

1. Increase in Sales

Reduced product cost, improved product quality, faster response, and higher market share could be achieved by efficient use of chain resources in a supply chain of the market. Making supply chain practice as a benchmark would provide organization with the opportunity of increased sales as this practice is an emerging concept adopted by many organizations. Benchmarking the supply chain performance against the best
practice in the organization would provide incentives for further improvement that will eventually lead to increased sale.

2. More Accurate Costing

SCM tools such as e-procurement, e-marketing, ECR, JIT, QR would provide organization more accurate costing for their product and service produced. This could be achieved through calculation of real-time and the updated information in key accounts of buyers and suppliers [Rao, 2006]. ‘JIT’ supply reduces the holding cost, which is difficult to predict. ‘ECR’ predicts future inventory of the product and assists in evaluating cost accurately.

3. Increase in Coordination between Departments

Making healthy relationship between customer and supplier together with the internal members of the organization is the synthesis of SCM concept. Strategic planning could increase integration between different departments of an organization through effective communication and information sharing system. This SCM practice helps to reduce the departmental barriers and develop an integrated plan across the organization. The benefits of close relationship with suppliers and customers are only realized in a well coordinated organization.

4. Increase in Coordination with Suppliers

Since SCM involves many supplier based practices such as ‘many suppliers’, ‘few suppliers’, ‘forming close partnership with suppliers’, ‘supplier management’, ‘strategic supplier management’, and ‘practice of e-procurement’ which could increase coordination with suppliers and helps to build more effective supplier relationships. Close partnership with supplier helps in product, process, and technology innovations like new product development, training required, workforce development, market requirement etc. This partnership will not only benefit the supplier and customer, but will also improve the relation with the suppliers due to a closer ‘control’ of the supply chain [Hello and Szekly, 2005]. Further, transactions could be managed more centrally and hence, it is clear that the increase in coordination with supplier in this context is via information technology [Rahman, 2004].
5. Increase in Coordination with Customers

Similarly SCM also emphasizes on customer relationship. Increase in coordination with customers could be achieved by developing close partnership with customers. This could be achieved by adopting SCM practices such as ‘potential customer orders’, ‘customer relationship’, ‘customer focus’, etc. Increase in coordination with customers can help to reduce late design changes and order changes, which ultimately affects the delivery performance of the organization.

6. Increase in Customer Service and Responsiveness

It is not surprising that most of the SCM organizations have achieved competitive advantage in the marketplace through customer service and responsiveness. Providing better services and quick response to the requirement of the customer gave them an additional advantage. SCM tools such as QR, JIT, ECR, e-procurement, e-marketing helps in increasing customer services and responsiveness.

7. Improve Supply Chain Communications

As per the definition of SCM, it improves communication to deliver superior customer service and value. Maintaining better and coordinated relationship between internal and external members of the chain improves supply chain communication.

8. Reduction in Risk, Product Development, Duplication of Process, and Inventory

Although there is lack of consistent opinion regarding these benefits. The literature shows that they may be treated as benefits of SCM, though, they are less important as compared to above benefits. All these represents the harder side of SCM as they focus on more traditional operations management areas such as process and inventory management.

2.6 Role of Quality Models in SCM

The importance and the potentiality of quality assurance models to support the supply chain integration and integrity of product specification are underlined by several researchers such as Schro¨der and McEachern [2002], Manning et al. [2006], Turner and Davies [2002]. Some of them have put forward the proposal that quality
assurance approaches to manage supply chain are the future for the companies especially as organisations “move away from commodity markets and into the more profitable specialty products” [Sparling et al., 2001]. Although much has been analysed and written about the new concept of supply chain quality management [SCQM], considered as a new way of dealing with quality management problems, concretely

SCM and SCQM seem to have the same meaning expressing a lack of concrete possible application. Malhotra and Robinson [2005] suggest that traditional quality programs focusing on approaches such as TQM, the Malcolm Baldrige National Quality Award and ISO 9001 [2000], must now transform to a supply chain perspective in order to simultaneously make use of supply chain partner relationships and quality improvement gains, essential to marketplace satisfaction. In the current intense global competition, SCM principles and technologies are taking centre stage as a mean to achieve business excellence. This SCM movement embraces quality management initiatives, further supporting the notion that product quality is only one aspect of quality oriented continual improvement programs leading to competitive leadership. Highly publicized companies such as Wal-Mart and Dell Computer have integrated their supply chains to make efficient use of information and technologies while orchestrating all activities of the chain [Lee, 2000]. Satisfying final customers can only be achieved when the whole chain commits, integrates, and coordinates to pursue coherent and innovative practices [Simchi-Levi et al., 2000]. According with this new approach we want to go beyond, creating a general model applicable in a more general context.

Unfortunately, the ISO 9001 norm is strictly addressed to quality aspects within a single company and lacks of a systemic approach to the supply chain. Therefore, a normative reference to build a quality system within the whole chain has not yet been defined. This system that refers to concept of quality as the satisfaction of all predefined requirements for any product could be the right answer to almost all the above mentioned needs.

2.7 SCM in Theory and Practice: a Transient Trend or Essential Change

During the past few years, supply chain excellence, optimization, and integration have become the focus and goal of many organizations worldwide. This is because
progressive firms are focusing on revenue growth instead of merely striving to meet annual cost reduction targets. Strengthening management of the supply chain is perceived by many firms as enhancing customer satisfaction and enabling profitable growth [AMR, 1997].

Depending on why and how the supply chain concept has been applied to problem solving, it has come to signify independent evaluation and/or implementation of one or more of the following characteristics:

1) an arrangement of suppliers of products and services;
2) A network for efficient management of demand and flow of products and services;
3) A philosophy of conducting business;
4) A strategy to gain competitive advantage through co-ordination and synchronization of actions of its members.

The underlying philosophy of managing supply chains has evolved to respond to these changing business trends. The supply chain management phenomenon has received the attention of researchers and practitioners in various topics.

In the earlier years, the emphasis was on materials planning, utilizing materials requirements planning techniques, inventory logistics management with one warehouse multi-retailer distribution system, and push and pull operation techniques for production systems.

In the last few years, however, there has been a renewed interest in designing and implementing integrated systems, such as enterprise resource planning, multi-echelon inventory, and synchronous-flow manufacturing respectively.

A number of factors have contributed to this shift and are as per following:

1) There has been a realization that better planning and management of complex interrelated systems, such as materials planning, inventory management, capacity planning, logistics, and production systems, will lead to overall improvement in enterprise productivity.

2) Advances in information and communication technologies complemented by sophisticated decision support systems enable designing, implementing and controlling strategic and tactical strategies essential to delivery of integrated
systems. The availability of such systems has the potential of fundamentally influencing enterprise integration issues.

3) The motivation in pursuing this research on the supply chain is to propose a framework that enables such issues to be dealt with effectively.

2.8 A Manufacturing Supply Chain Network

Manufacturing supply chain network is an integral part of the supply chain management process. It involves various activities such as obtaining, implementing and managing the organization's manufacturing network and by passing the supplies from the plants in order to get to the final product in the supply chain. Manufacturing network of any organization involves the procedure of developing the variety of products in a timely manner with the lowest possible cost incurred and, which respond positively to the customers changing demands. For that every company needs to work on day to day basis with the following strategic points:

2.8.1 Goals

Supply chain goals are mutually agreed upon between members in a spirit of cooperation. Members negotiate and compromise with each other, in order to arrive at acceptable goals. Goals for the supply chain are set at two levels. Members synergize their activities and resources toward accomplishing common goals for the supply chain as a group that aim to benefit all, and not just a few among the group. In addition, members may pursue individual goals that reflect their organizational values and expectations. However, the two sets of goals must be coordinated in order to be effective performance measures for the supply chain. This may require tuning individual goals of members such that common supply chain goals can be met.

2.8.2 Objectives

Supply chain objectives directly support its stated goals. As such, they are derived from published goals. For example, a common manufacturing supply chain goal can be to enhance revenue through eliminating or alleviating bottleneck operations in the system. Supply chain objectives that directly support this goal can be identified as:

1) Increase through-put;
2) Reduce cycle time;
3) Reduce inventory at different stages [raw materials -work-in-process -finished goods].

A reduction in processing time and set-up time will allow smaller batches to be processed faster, thereby lessening congestion in the system and registering shorter cycle time. This will also create increased through-put, and consequently, a higher revenue stream in the supply chain. As a result of this improvement in the supply chain, the tertiary objective of reduced inventory at different stages, which supports both the primary and secondary objectives, can be realized, since inventory at different stages will not have to wait for availability of operations for further processing.

2.8.3 Modeling Principles and Approaches

A productive system such as a supply chain generates a stream of waste, primarily due to potential structural weaknesses in its design. A manufacturing enterprise may carry potential waste throughout its product and/ or service life cycle.

Next, modeling principles that can be applied to managing waste in the context of the manufacturing supply chain example are discussed. These principles are generic enough so that the modeler may ascertain characteristics of the problem independent of the specific problem environment. Consequently, the approach delivers solution[s], or the solution method, that are intrinsic to the problem and not its environment.

The strategic and operational decisions require different perspective. The strategic decisions are, for the most part, global or “all encompassing” in that they try to integrate various aspects of the supply chain. Consequently, the models is that describe these decisions are huge, and require a considerable amount of data. Often due to the enormity of data requirements, and the broad scope of decisions, these models provide approximate solutions to the decisions they describe. The operational decisions, meanwhile, address the day to day operation of the supply chain. Therefore the models that describe them are often very specific in nature. Due to their narrow perspective, these models often consider great detail and provide very good, if not optimal, solutions to the operational decisions.
2.8.4 Developing Coordinated Strategies

The implementation of waste management models for a manufacturing supply chain mandates cohesive strategies that support goals and objectives of the enterprise. There is a need for models that describe and implement controls of various subsystems for controlling the total supply chain system. An outline of a model that focuses on the dynamic structure of the supply chain and effective coordination of its processes is described. Such a model enables developing interaction between production and marketing policies between the supply process of raw materials and the production of finished products.

Developing interaction of marketing and production strategies, however, offers opportunities for modeling coordination and synchronization in a supply chain. The proposed framework emphasizes such an approach. Some of the advantages of pursuing coordinated strategies are highlighted below:

1) Maintaining effective inventories while realizing production efficiencies.
2) Achieving integration through synchronization and coordination of various system components.
3) Potential of increase in supply chain payoffs.

2.8.5 Implementation

The implementation of the proposed framework is illustrated with the help of manufacturing supply chain examples from the food and steel industry respectively.

1) In the case of the food industry, common objectives between members are to manage lead-time and inventory at various stages in the supply chain. Similarly, lead-time and inventory are also managed within a member. Coordination of activities of various entities in the supply chain is achieved through information sharing with feed-forward and feed-back mechanism, in a closed loop system form.

For example, lead time is negotiated and committed through a bidding process, and plans at various stages are shared through information loops. Owing to the usually heavy marketing focus of the food industry, cooperation among functions is modeled
to incorporate every facet of the product life cycle, from raw material source to the consumer.

2) In the case of the steel industry, common objectives between members are to manage production batches, lot sizes, and process and set-up times at various stages in the supply chain. Lead-time and inventory are managed within a member. Coordination of activities of various entities in the supply chain is achieved through information sharing with feed-forward and feed-back mechanism, in a closed loop system form.

For example, lead time is negotiated and committed through a bidding process, and plans at various stages are shared through information loops. Owing to the usually heavy production focus of the steel industry, cooperation among functions is modeled to emphasize operations and the associated logistics, from raw material source to finished steel product.

2.9 SCM Practices Across the World

SCM practices are used worldwide in so many countries and in various segments i.e. engineering industry, food industry, pharma industry, electronics industry, dairy industry etc. Results which were received by all the various industries are attractive and due to that now a day’s in spite of their scale of operations every industry are turning towards the efficiently implementation of SCM in all the departments of the company.

2.9.1 SCM Practices in Australia & New Zealand

Supply chain management [SCM] is a new concept involving the integration of all the value-creating elements in the supply, manufacturing, and distribution processes: from raw material extraction, through the transformation process, to end user consumption. Batley [1996] studied the best manufacturing practices in Australia and New Zealand and examined the link between manufacturing practices and firm performance. They found that firms had improved their practices in the preceding five years.

There was also a strong correlation between adoption of best manufacturing practices and performance in the areas of sales growth, export growth and cash flows. Corbett
[1996] found that globally-oriented manufacturing firms emphasized more on quality improvement, process improvement, and design for manufacture, and these firms had world-class manufacturing performance. Batley [1999] reported that there was general acceptance of the concepts of total quality management in New Zealand, although not all tenets were practiced. Knuckey, Leung-Wal and Meskeill [1999] adapted the best practices model of Australian Manufacturing Council [Anonymous, 1994] to further assess the manufacturing practices in New Zealand. They found that New Zealand firms had improved their practices in a holistic way.

In particular, the improvement was focused on the relationships in the supply chain, from the suppliers to the customers. On the negative side, they stressed that improvements were needed in the areas of human resource management, technology, and benchmarking. However, Knuckey and Johnston [2002] found that the focus in supply chain relationships was more on customers rather than suppliers. A recent study of Australian and New Zealand logistics competences, by Mollenkopf and Dapiran [2005] concluded that firms in these countries tend to be working on their internal logistics/supply chain processes and generally lack externally orientated capabilities. Apart from these studies, there is a dearth of empirical studies on SCM practices in general, and specifically in regard to Australia and New Zealand.

### 2.9.2 SCM Practices in USA

In USA SCM practices are implemented in various industries and stores. Some examples are as per following:

1) Wal-Mart is the biggest example of the same. In Wal-Mart’s progress SCM has played major role and at present the chain of the Wal-Mart stores are the number one in world. Wal-Mart's overall business strategy is to provide Every Day Low Prices [EDLP] to customers. As a reminder, EDLP is not a guarantee to customers that they will always find the lowest prices on a given product, but it does ensure that Wal-Mart prices will not erratically fluctuate due to promotional activities. Aside from everyday low prices, a complementary element to their strategy is the variety of product offerings at Wal-Mart retail outlets. Wal-Mart has many competitors across retail segments, due to the fact that Wal-Mart's product offerings cover a wide range in one convenient location. The fact that a customer
can find so many products under one roof is a competitive advantage for Wal-Mart.

2) Amazon.com's business strategy is to compete on selection, convenience, and price. Amazon.com's goals through its vision statements are to be "earth's most customers centric company" while providing "earth are biggest selection" [Amazon.com 2003 Annual Report]. Underlying Amazon.com's strategy and vision is a cultural and organizational commitment to innovation. The company has built their supply chain to support their business strategy through a multi-tier supply chain design, innovative inventory management techniques, and a focus on cost-effective processes.

3) Rolls-Royce's business strategy and the important competencies that make a supplier competitive in the current aerospace landscape. This framework is used to explore how Rolls-Royce's supply chain operating model contributes to strengthen its strategic positioning and business strategy as a tier 1 supplier in this industry. Four strategy models [i.e. those proposed by Simchi-Levi 93, Fisher94, Hammer95 and Porter96], which study the relationship between supply chain design and its role in the company's business strategy, are used to analyze the role of Rolls-Royce's supply chain operating model in its business strategy. Its supply chain is an integral part of its business strategy and helps maintain a strategic parity with the competitors.

2.9.3 SCM Practices in Germany

In Germany SCM practices are successfully implemented in the various sectors and following are the examples:

1) The aim of Supply Chain Management is to optimize the value added chain at Siemens globally in a coordinated manner on the basis of standardized processes. Apart from contributing value to operating results through savings in procurement, this also includes quality assurance as well as guaranteeing delivery reliability and dependable, efficient logistics. All this is tightly intermeshed with the Siemens objective of sustainability. Until 2005, Supply Chain Management throughout the Group was organized almost exclusively vertically within the three sectors. When the SCM initiative was launched in April 2005, the idea was to leverage synergy potentials of the company as a whole more effectively. The
objective is to achieve sustained optimization over the long term. Among other things this includes building close partnerships with suppliers, particularly in growth markets. The aim here is to establish good cooperation relationships that deliver lasting value to both parties. The selection process plays a vital role in this. Siemens is looking not just for the best suppliers, but also for those suppliers most closely living up to Siemens’ own objective of ‘sustainability.

2) When it comes to the world’s most powerful brands, Coca-Cola is still number one. The iconic beverage maker, which has dominated the global soft drink market for more than a century, continued its 12-year reign at the top in 2011, according to Interbrand’s latest global rankings. For Coca-Cola, achievements like this are by products of a vision and an operating framework that is built on excellence. At Coca-Cola Enterprises [CCE], the exclusive Coca-Cola bottler for its territories in Western Europe, the company’s goal is to be the number 1 or strong number 2 choice in every category it competes in. But on the road to long-term, sustainable growth, CCE faces similar challenges to many other manufacturing and logistics businesses. A top priority is replacing dated systems with a modernized platform across markets to create a cohesive view of metrics and streamlined processes. “We are a shelf-replenishment company, a supply chain company, a sales and customer services company,” says Esat Sezer, senior vice president and chief information officer of CCE. “It is very important for us to integrate our manufacturing plants all the way up to the replenishment of shelves in the retail outlets. Through the information side of the equation, we are basically tying those two ends of the business process together: the manufacturing side, which drives the supply of our product, and the shelf-replenishment side, which drives the demand part of our product.”

2.9.4 SCM Practices in China

Distribution and logistics present a significant challenge for companies doing business in China. Morgan Stanley estimates that, in 2001, logistics spending in China amounted to one-fifth of the nation’s GDP – twice the level spent on logistics in the United States. According to a December 2001 Economist Intelligence Unit report, 90 percent of an average Chinese manufacturer’s time is spent on logistics, while 10 percent is spent on manufacturing. Accounts receivable – a key measure of inefficient logistics practices – often exceeds 90 days.
Despite these weaknesses, China’s distribution and logistics sector is growing rapidly. The logistics industry reported annual revenue growth of 35 percent for 2000 and 55 percent for 2001. Additionally, the sector is expected to grow 50 percent per annum through 2004.

2.10 Strategic Factors for SCM Approach

In fact, the SCM approach has been engaged by many organizations to improve their organizational performance and enhance competitiveness in the market place.

The five strategic factors are:

2.10.1 Building Customer-Supplier Relationship

Good relationship management with suppliers and customers is a crucial element of supply chain management. By this relationship good and loyal supplier base is formed and they will support the company in the bad days were new suppliers will not show much interest. Same as support of good customers is also needed to every company by whom order will be continuous and due to that growth of the company will be higher. In the past, emphases was placed on the importance of adversarial or arms-length relationship as the way of business of doing business. Now, closer, trust based and long term relationships with supply chain partners is imperative in sustaining competitive advantage as no company could maintain leadership in all of the different critical technologies required for producing a wide range of products. The non-core processes, sometimes with part of the core processes, have to be outsourced and for that permanent supplier base is needed and that has to be maintaining by good relationship. Due to that they will work for you day and night on top priority bases.

2.10.2 Implementing Information and Communication Technology

Due to the “explosion” of system-wide information and communication technologies, supply chain members can share rich information to lower costs more than ever before. In order to improve the efficiency and effectiveness of SCM, different kind of software tools and technologies are being employed that allows speedy information transfer and make it more useful and applicable under different situations along the supply chain. Now a day’s in market so many soft ware’s available for different processes and due to that supply chain members can update themselves with the latest
technology and processes and that can save the cost and time. Due to that manufacturing time is cut off and deliveries will be faster and simultaneously cash flow will be faster. So many saving in terms of cost and time can be achieved with the help of implementation of latest information and technology system.

2.10.3 Re-Engineering Material Flows

Effective management of material flows in the supply chain is the most imperative strategic success factor. Towill et al., [2000] opined that control of smooth material flow lies at the heart of best SCM designed and practices and re-engineering of material flows can improve supply chain performance. This will help to shorten the waiting time at each and every process and due to that it will cut off over all manufacturing time. Moreover, the efficient flow of material ensures products are delivered to customers on time. This implies that inventories of raw materials, work-in-process [WIP] and finished goods can be kept at the lowest level, which can reduced the inventory holding costs significantly and the inventory turnover ratio will be higher and it will result in good turnover of the company [Fredendall and Hill, 2001].

2.10.4 Creating Corporate Cultures

The single most important prerequisite for successful SCM is the change of corporate culture. Culture reflects the norms that characterized an organization and shape the expectations about what are appropriate behaviors and attitudes [Schwartz and Davis, 1981]. Change of corporate culture is necessary as the traditional culture only emphasizes organizational performance from the short-term view point, which contradicts the objective of SCM to achieve high performance and profitability consistently in a way that benefits all contributed in the supply chain [Tan et al., 1998]. Culture supporting behavior, openness, inquiry and experimentation will be of great benefit to supply chain members [Spekman et al., 2002]. Every employee in the organization should know the organization’s goal and also should be well aware of his/her duties or contribution to achieve the same. They should be we aware of the complete job knowledge and flow of the processes. In corporate culture it is must to give every employee orientation in each and every department and due that everyone should be well aware of the departmental functionality.
2.10.5 Identifying Performance Measurements

There is a need to develop supply chain wide performance measures to measure the performance of the organization and the employees. By setting the system of measuring performance any changes in the supply chain system can be made and due to that aim behind the supply chain implementation of the system can be achieved. With appropriate performance matrices, companies can find the opportunities and motivation to drive the continuous improvement in the supply chain. Relevant performance measurement can also encourage every firm in the supply chain and all employees in each firm to direct all of their efforts to increasing profitability in the supply chain [Fredendall and Hill, 2001]. Under the SCM philosophy, the performance matrices are no longer organization based but supply chain wide. Many companies lack performance measures for the complete supply chain and it is necessary to adopt channel-spanning performance measures as strategy to please customers and enhanced profitability [Lee and Billington, 1992; Anderson et al., 1997].

2.11 Decision Areas in SCM

Four major areas pertaining to Supply Chain Management [SCM] are:

1. Location
2. Production
3. Inventory
4. Transportation [Distribution]

These decision areas include both strategic and operational elements. These decisions are of great significance to a firm since they represent the basic strategy for accessing customer markets, and will have a considerable impact on revenue, cost, and level of service. They are described below:

1. Location Decision

In SCM location of the plant plays major role. The geographic placement of production facilities, stocking points, and sourcing points is the natural first step in creating a supply chain. The location of facilities involves a commitment of resources
to a long-term plan. Once the size, number, and location of these are determined, so are the possible paths by which the product flows through to the final customer. These decisions should be determined by an optimization routine that considers production costs, taxes, duties and duty drawback, tariffs, local content, distribution costs, production limitations, etc. [Arntzen, Brown, Harrison and Trafton [1995]]. Although location decisions are primarily strategic, they also have implications on an operational level if the selection of location is not proper and the facilities to the staff, manufacturing and other basic needs are not fulfilled than the project may be failed.

2. Production Decision

The strategic decisions include what products to produce them in, allocation of suppliers to plans, plans to distribution centers, and distribution centers to customer markets. These decisions majorly give impacts on the operational decisions and due to that they are very important for the whole cycle of the SCM and timely supply of the material to the end customer. Operational decisions focus on detailed production scheduling. These decisions include the construction of the master production schedules, scheduling production on machines, and equipment maintenance. As before, these decisions have a big impact on the revenues, costs and customer service levels of the firm. These decisions assume the existence of the facilities, but determine the exact path[s] through which a product flows to and from these facilities. Another critical issue is the capacity of the manufacturing and this largely depends on the degree of vertical integration within the firm. Other considerations include workload balancing, and quality control measures at a production facility.

3. Inventory Decisions

The effect of strategic, operational & tactical decisions cumulative effect is on inventory decision. These refer to means by which inventories are managed. Inventories exist at every stage of the supply chain as either raw material, semi-finished or finished goods. These include development strategies [push versus pull], control policies the determination of the optimal levels of order quantities and reorder points, and setting safety stock levels, at each stocking location. They can also be in-process between locations. Their primary purpose to buffer against any uncertainty that might exist in the supply chain. Since holding of inventories can cost anywhere between 20% to 40% of their value, their efficient management is critical in supply
chain operations. It is strategic in the sense that top management sets goals. However most researchers have approached the management of inventory from an operational perspective. These levels are critical, since they are primary determinants of customer service levels. In any organisation inventory decision is very crucial and on that companies turn over, profits, etc. are dependent.

4. Transportation Decisions

Timely, safer and reasonable transportation is very much helpful to the company in terms of the dispatches of the semi finished and finished jobs to the sub contractor and customers. Due to that company can get timely payments from customers, completion of the semi finished jobs into the finished jobs and rotation of the inventory will be faster. The mode choice aspects of these decisions are the more strategic ones. These decisions are closely related to the inventory, turn over and finance of the company. These closely linked to the inventory decisions, since the best choice of mode is often found by trading-off the cost of using the particular mode of transport with the indirect cost of inventory associated with that mode. While air shipments may be fast, reliable, and warrant lesser safety stocks, they are expensive. Meanwhile shipping by sea or rail may be much cheaper, but they necessitate holding relatively large amounts of inventory to buffer against the inherent uncertainty associated with them. There for customer service levels and geographic location play vital roles in such decisions. Since transportation is more than 30% of the logistics costs, operating efficiently makes good economic sense. Shipment sizes [consolidated bulk shipments versus Lot-for-Lot], routing and scheduling of equipment are key in effective management of the firm’s transport strategy.

2.12 Role of Logistics in Supply Chain

Small & medium road-transporters have grown to the status of Third Party Logistics providers [3PL] by widening their activities and become partners of larger organizations. For the success of any organization logistics has major role to play and due to timely internal as well as external transportation companies can win any challenge. Broadly, the common functions in “Logistics: today are:
2.12.1 Inbound Logistics

The purchase department decides the suppliers or vendors for different bought-out materials / parts and places orders on them with broad details of quantity and delivery period for each item.

The production planning department prepares manufacturing plans and schedules for day / week / month which show the exact requirements of each item from the bill of material. The stores department has the record of the items available within the stores.

Combining the above information, Logistics Managers plans the specific details of procurement quantity, timing, mode of transport [rail/road/ship/air], route, ware-house requirement, handling systems so that the exact quantities of each item are available within the factory at the specified time. Logistics Manager also takes care of the administrative tasks of like payment of local taxes, duties, customs clearances at ports, airports. In addition logistics decide proper communication system to trace, track and coordinate the movement of materials from suppliers to factory via warehouse, transit points etc. all the above activities should be planned and executed by the Logistics department at the lowest cost ensuring availability of materials to the factory without stock-outs.

2.12.2 Processing Logistics

In large factories, the conversion / processing of raw materials into finished products takes place at a number of stages in different manufacturing / assembling / testing units, spread over large areas / long distances. The logistics function in this is to plan, coordinate and move the work on process the various departments smoothly. They may need internal handling / transport facilities like overhead cranes, fork-lifts, conveyors, trucks and even internal rail-transport [ex. Steel plants]. They also take care of disposal of bye-products, industrial waste, scrap, rejections etc.

2.12.3 Outgoing Logistics

Once a product is finished by the processing plant the entire operations of packaging, moving to central warehousing, planning of transport modes / routes to deliver the items in suitable consignments to customers / retailers through regional warehouses, coordinating all the partners, tracing and tracking the items movement avoiding
bottle-necks are under Outgoing Logistics department. They also need to install and develop good communication systems between the customers and the distribution channels, up to production units to accommodate any modifications, last-minute changes and market fluctuations of customer demand. The responsiveness of entire supply chain depends upon the functioning of outgoing logistics. They also manage “reverse logistics”- items returned by customers like rejections, empty containers, gas cylinders, bottles back to the factory. They also need to coordinate with sales / finance to properly account for the payments for the delivered item with all delivery documentation. Present trend in large organization is to “Outsource” logistic function to outside agents.

2.12.4 Physical Logistics

The importance of the management of physical inventory is being amplified by the following factors; decreasing product life-cycles; decreasing levels of standardization of products and demands for customization; customers demanding shorter delivery lead times; increased levels of competition due to globalization and lowering of tariff barriers; and increasing levels of dynamism [rate of change], complexity [number of changes] and uncertainty [what will change?] in global markets [Stalk and Hout, 1990; Pine, 1993; Handfield and Nichols, 1999]. Levels of inventory in supply chains are directly linked to cycle times, and cycle times in physical logistics are largely a function of distance, uncertainty and complexity [Bowersox and Calantone, 1998]. From the point-of-view of the movement of physical goods, an integrated supply chain offers the opportunity for firms to compete on the basis of speed and flexibility, while at the same time holding minimum levels of inventory in the chain. Rather than goods being held at various points within the chain, they will be moving between these points.

Basic Internet applications will become table stakes – companies will not be able to survive without them, but they will not gain any advantage from them. The more robust competitive advantages will arise instead from traditional strengths such as unique products, proprietary content, distinctive physical activities, superior product knowledge, and strong personal service and relationships. Internet technology may be able to fortify those advantages, by tying a company’s activities together in a more distinctive system, but it is unlikely to supplant them [Porter, 2001, p. 78].
One strategic outcome of supply chain integration can be “channel consolidation”, or the concentration of control of distribution channels by a small number of players. In this case there will undoubtedly be winners and losers as suppliers into these channels also will likely be consolidated. Fein and Jap [1999] identify four strategic responses for manufacturers finding themselves confronted with this situation:

1) Partner with the winners: appropriate when the winners are easy to spot;
2) Invest in fragmentation: work with marginalized distributors to create alternative channels;
3) Build an alternative route to market by forward integration and [perhaps] use of the internet; and
4) Create new channel equity: use differentiation and develop brand equity.

2.13 Supply Chain Management Activities / Functions

Supply chain management is a cross-function approach to manage the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and then the movement of finished goods out of the organization toward the end-consumer. As organizations strive to focus on core competencies and becoming more flexible, they have reduced their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other entities that can perform the activities better or more cost effectively. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing management control of daily logistics operations. Less control and more supply chain partners led to the creation of supply chain management concepts. The purpose of supply chain management is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and improving inventory velocity.

Several models have been proposed for understanding the activities required to manage material movements across organizational and functional boundaries. SCOR is a supply chain management model promoted by the Supply Chain Council. Another model is the SCM Model proposed by the Global Supply Chain Forum [GSCF]. Supply chain activities can be grouped into strategic, tactical, and operational levels of activities.
2.13.1 Strategic

a) Strategic network optimizations, including the number, location and size of warehousing, distribution centres, and facilities.
b) Strategic partnership with suppliers, distributors, and customers, creating communication channels for critical information and operational improvements such as cross docking direct shipping, and third-party logistics.
c) Product life cycle management, so that new and existing products can be optimally integrated into the supply chain and capacity management.
d) Information Technology infrastructure, to support supply chain operations.
e) Where-to-make and what-to-make or buy decisions.
f) Aligning overall organizational strategy with supply strategy.

2.13.2 Tactical

a) Sourcing contracts and other purchasing decisions.
b) Production decisions including contracting, scheduling and planning process definition.
c) Inventory decisions, including quantity, location, and quality of inventory.
d) Transportation strategy, including frequency, routes and contracting.
e) Benchmarking of all operations against competitors and implementation of best practices throughout the enterprise.
f) Milestone payments
g) Focus on customer demand

2.13.3 Operational

a) Daily production and distribution planning, including all nodes in the supply chain.
b) Production scheduling for each manufacturing facility in the supply chain [minute by minute]
c) Demand planning and forecasting, coordinating the demand forecast of all customers and sharing the forecast with all suppliers.
d) Sourcing planning, including current inventory and forecast demand, in collaboration with all suppliers.
e) Inbound operations, including transportation from suppliers and receiving inventory.

f) Production operations, including the consumption of materials and flow of finished goods.

g) Outbound operations, including all fulfilment activities, warehousing and transportation to customers.

h) Order promising, accounting for all constraints in the supply chain, including all suppliers, manufacturing facilities, distribution centres, and other customers.

2.14 Supply Chain Business Process Integration

Successful SCM requires a change from managing individual functions to integrating activities into key supply chain processes. An example scenario: the purchasing department places orders as requirements become appropriate. Marketing, responding to customer demand, communicates with several distributors and retailers as it attempts to satisfy this demand. Shared information between supply chain partners can only be fully leveraged through process integration.

Supply chain business process integration involves collaborative work between buyers and suppliers, joint product development, common systems and shared information. According to Lambert and Cooper [2000] operating an integrated supply chain requires a continuous information flow. However, in many companies, management has reached the conclusion that optimizing the product flows cannot be accomplished without implementing a process approach to the business.

The key supply chain processes stated by Lambert [2004] are:

a) Customer relationship management
b) Customer service management
c) Demand management
d) Order fulfilment
e) Manufacturing flow management
f) Supplier relationship management
g) Product development and commercialization
h) Return management
In demand following characteristics are included by the management:

a) Internal and external collaboration
b) Lead time reduction initiatives
c) Tighter feedback from customers and market demand
d) Customer level forecasting

Other critical supply business processes combining these processes stated by Lambert such as:

a) Customer service management
b) Procurement
c) Product development and commercialization
d) Manufacturing flow management / support
e) Physical distribution
f) Outsourcing / partnerships
g) Performance measurement

2.14.1 Supply Chain Sustainability

Supply chain sustainability is a business issue affecting an organizations supply chain or logistics network and is frequently quantified by comparison with SECH [Social, Ethical, and Cultural & Health] ratings. SECH ratings are defined as social, ethical, cultural and health footprints. Consumers have become more aware of the environmental impact of their purchases and companies’ SECH ratings and, along with non-governmental organizations [[NGO]s], are setting the agenda for transitions to organically grown foods, anti sweatshop labor codes and locally produced goods that support independent and small businesses. Because supply chains frequently account for over 75% of a company’s carbon hub footprint many organization are exploring how they can reduce this and thus improve their SECH rating. It is very important to sustain any company to maintain all the criteria’s and survive in this competitive market and SCM is very much helpful to any company to survive.
2.14.2 Stages / Components of Supply Chain

The basic stages / components in a supply chain can be classified as:

a) Supplier’s / Vendors / Sub-Contractors
b) Processing plants / facilities
c) Distribution / sale channels of finished products to customers.

However, the chain becomes very large and complex in larger organizations due to the large number of suppliers from whom raw materials / components and other services are procured, located at different places geographically as well as processing factories which may at more than one location and finally the warehouses, wholesalers and retailers spread over large regions to reach customers. All the external organizations involved in this supply chain are considered as “SC PARTNERS” who have a share in the profits and risks of the total chain performance. This creates a deep sense of participation, overcoming individual objectives of each partner.

Supply chain management is the effective, coherent and responsive integration of the flow of materials, money and information across the entire supply chain, to serve customers while maintaining the profitability and growth of all the partners involved.

2.15 Key Issues in SCM

General Putzger [1998] states that the key criterion in implementation is correct choice of information technology, and that the use of third-party providers for both transportation and information management is the option chosen by successful performers. Bowman [1997] says that many companies are unsuccessful in implementation because they simply are unable to come to agreement on terms. He notes that this has been an important reason for the development and adoption of the standards supporting the supply chain operations reference [SCOR] model [discussed below]. In documenting implementation in a European company, Hammant and Fisher [1997, p. 100] list seven critical success factors:

1) A committed organization, from the board down;
2) Effective programmed management;
3) Consistent, pre-emptive communications;
4) Positive action to identify and manage key risks before they become issues;
5) A well-defined and managed programmed baseline, changed as necessary;
6) A succession of manageable delivery milestones to maintain momentum and confidence; and
7) An actionable, owned, manageable and measurable set of business benefits.

2.15.1 Strategic Level

a) The number, location and capacity of manufacturing plants / warehouse.
b) Strategic Partnerships – With suppliers, Transporters, Distributors, Retailers.
c) Flow of materials through the logistic networks.
d) Supply contracts
f) Product Design – Features, size, capacity, and technology needed, cost.
g) Customer value – Utility, cost, uniqueness / pride, service.
h) IT and Decision Support Systems. Flow of money / finance through the chain-system of payments / Receipts policies.

2.15.2 Tactical Level

a) Production: Which items / how much value / when to produce.
b) Purchasing: Procurement of raw materials / Components / External Services
c) Transportation: Type, frequency, cost, time location of moving materials.
d) Inventory Policies: When / how much / at what rate to purchase & store.
e) Customer-Calls Frequency: Contacting customers to receive orders and payments.
f) Cash Flow Review: Payment / Receipt / Credit

2.15.3 Operational Level

a) Scheduling: When and what item to produce–time period for starting each product.
b) Lead Time: How much time is needed for the specific quantity to produce.
c) Routing: Where / on which machines / facilities- to produce.
d) Loading: Moving the materials physically through the various production stages.

Based on this evolution, both upstream firms and downstream firms have to be managed directly or indirectly by companies in order to satisfy their customers. Lee
[2000] pointed out that SCM involves the flow of materials, information and finance in the network consisting of the customers, suppliers, manufacturers and distributors. Coordination and integration of these flows and their correlated activities within and across companies through improved supply chain relationships to achieve a sustainable competitive edge are critical for effective SCM.

2.16 Examples of Organizations Practicing SCM

At present in India and globally majority of the organizations have now started implementing supply chain management practices apart from their scale of operation. Following are the examples:

2.16.1 Global

a) All automobile manufacturers like Ford, Toyota, General Motors who have design, manufacturing, procurement, distribution / marketing spread over many continents and countries.

b) Consumer durables, pharmaceuticals, consumer product manufacturers like Proctor & Gamble, Unilever, Sony, Dell [Computer], Nestle, Merck’s, Nike, Reebok, Addidas, Nokia, Samsung etc.,

c) Global retailers like Wal-Mart, Food-chains like McDonald.

2.16.2 Indian


By the following examples how the companies are working interplant and with their vendors through SCM:

a) The world famous sports shoe maker “NIKE” of USA mainly designs and plans marketing at their Head quarters in USA, but has material suppliers as well as manufacturing plants across the world – in South Korea, Taiwan, China and a few European Countries. The products are sold in most of the countries in the world. “NIKE” requires SCM to plan their purchasing, production and distribution functions with high integration of all partners across the globe to sell their competitive products for changing customer demands.
b) Indian car maker ‘MARUTI’ has an extensive network of raw material and parts suppliers, transporters, Factories, distribution channels, agents and service providers/maintenance units for their customers. All these are connected through special I.T. systems to provide information and integrate the activities to avoid bottlenecks, excess inventory etc.

To implement and support the SCM practices following ERP systems are used by the organization:

1) MANUGISTICS
2) I2-TECHNOLOGIES
3) BAAN
4) SAP
5) Oracle

2.17 Outsourcing Widely to Focus on Core-Competencies

It is realized that organizations whether within a country or multinational companies [Global] have to continuously grow to remain competitive and sustain profitability. They need to build extensive suppliers, service providers and distribution facilities to make wider variety, cheaper products needed for customers and deliver them fast. Constant effort to reduce product cost and provide better return to customers involves close coordination among all the partners in the supply chain.

To reduce costs, production time of end product, expansion or increase facility of machinery for small operation, many large organizations today, outsource most of the non-core activities, which once they were doing themselves earlier and increase focus on Core-competency, standardization of product and reduce the production time and due that the material turnover ratio get higher and ultimately it results in high turnover of the organization.

Generally product design, special manufacturing techniques and marketing strategies come under core-competency and companies are interested to focus on that only. So, SCM is needed to coordinate all other functions, outsourced to external partners. The capability to develop strategic partnerships which work smoothly, differentiate the leaders from others, in the large global Multinational organizations now.
Example

Up to 1990’s, General Motors of USA was the top automobile manufacturer in the World with the highest sales, profits and growth for over 50 years. However, by adapting SCM practices more successfully Toyota of Japan could overtake General Motors to become the largest automobile maker in the world now, even though Toyota started its production only 30 years back. Toyota today is considered as the model for the best SCM practices in the world. It treats its supplies and sub-contractors with such respect and concern for their growth that even USA auto ancillary units are keen to work for Toyota instead of General Motors and Ford!

In India the car-maker MARUTI has retained its top position in the country by adapting SCM practices. It is able to reduce material costs considerably by developing competent ancillary suppliers, who make, store and supply the parts with the lead time of only few hours for final assembly at MARUTI factory. The ancillary suppliers are widely spread over other States like Tamilnadu, Maharashtra, Punjab and Gujarat. Automatic ordering, payments and control are done through advanced IT systems online in real-time. These ‘Lean manufacturing’ practices have made MARUTI highly competitive among the car-producers.

Many small and medium scale industrial units in India are able to now become partners and supply components/services to large Indian Firms and MNC’s like Ford, G.M, Phillips, P&G, Wal-Mart, and Merck etc. With the collaboration and technical & marketing support they could grow to become quality International Tier I & II partners of Global giant Corporations, improving prosperity and opportunities in India.

2.18 Total Quality Management [TQM]

TQM has to play a very vital role in implementation of SCM practices. TQM is management philosophy that encourages cost reduction, the creation of high quality goods and services, customer satisfaction, employee empowerment, and the measurement of results. Sound SCM strategies focus on developing strategic alliances based on core competencies. In the new economy, companies operate in a physically distributed manufacturing or service environment. To integrate the activities of partnering firms along the value chain, various information technologies and systems
such as ERP have been used. Suitable education and training to deal with diversity in language and culture are a practical necessity as are systems [technical and social] designed to accommodate cultural diversity. A fundamental challenge in applying TQM in supply links up and down the value chain as required in SCM, in the development of programs and techniques that encourage that culturally diverse workforces to continuously improve all areas of organizational performance.

TQM can enhance communications along the supply chain through enhancement of quality in ERP, partnership development, and customer relationship management [CRM] [Madu and Madu, 2003]. Gowen and Tallon [2003] suggest that management and employee interactive support can enhance the effectiveness of employee training and mitigate the adverse effect of implementation barriers on the success of SCM practices. TQM practices such as Six Sigma and Black Belt methodologies could enhance productivity and quality throughout the supply chain. A properly implemented TQM program could play a major role in developing an integrated enterprise through education, communication, positive relationship development and teamwork across the supply chain, but there is not yet research to demonstrate it so.

The six major dimensions of SCM are:

a) Partnership  
b) Information technology  
c) Operational flexibility  
d) Performance measurement  
e) Management commitment  
f) Demand characterization [Lee and Kincade, 2003]

TQM enablers such as training and education, cross-functional teams, communication, teamwork, empowerment, job satisfaction and technological support can impact any one or all of the six major dimensions of SCM. Considering the need for integrated business processes in SCM, TQM enablers could play a major role in promoting effective integration of suppliers and customers along the value chain.

Since management philosophy tends to be intangible and aims to describe an ideal, TQM and SCM could be further develop to include innovative management practices,
tools, techniques, applications and anything else that would be in line with both conceptual approaches.

Although TQM and SCM share the same ultimate goal, which is customer satisfaction, their primary goals are different, as implied by the emphases on “quality and supply”. Better quality and a faster delivery always lead to lower costs. Finally, a better quality data code [QDC] enhances customer satisfaction and the competitiveness of the whole supply chain. In some cases, there may be a trade-off if conflict arises between quality and delivery performances and this is when the difference in primary goals can present potential problems in implementing an integrated TQM and SCM approach. On the other hand, there is synergy in the ultimate goal, since both TQM and SCM aim to achieve customer satisfaction.

2.19 Supply Chain Quality Management Based on the TQM Principles

A critical part of the management of quality is the strategic and systematic approach to achieving an organization’s vision, mission, and goals. A major thrust of TQM is continual process improvement. Continual improvement drives an organization to be both analytical and creative in finding ways to become more competitive and more effective at meeting stakeholder expectations. During times of organizational change, as well as part of day-to-day operation, effective communications plays a large part in maintaining morale and in motivating employees at all levels. Communications involve strategies, method, and timeliness.

All employees participate in working toward common goals. Total employee commitment can only be obtained after fear has been driven from the workplace, when empowerment has occurred, and management has provided the proper environment. High-performance work systems integrate continuous improvement efforts with normal business operations. Self-managed work teams are one form of empowerment.

2.19.1 Customer Focus

Customer focus is the core principle and idea of TQM because quality effort comes of customer’s needs and ends with customer’s acceptance. In supply chain circumstance, customer includes not only the end user but also many in-between users, such as suppliers, manufacturers, sellers, etc. However, more than half of the quality problems
in supply chain are resulted by specifications because of the inadequate communications between the members of supply chain. In many cases, the procurement specifications released by buyers are equivocal while suppliers dare not to argue against buyers on the specifications in the bidding process. Therefore, the core enterprise must pay attention to the needs and expectation of end users, and all the members of supply chain must pay attention to the needs and expectation of their backward users. The needs and expectation of end users should be deployed layer upon layer in the whole supply chain system. The end users will satisfy if all the member of supply chain can satisfy the needs of their backward users.

2.19.2 Leadership

The effective of quality management depend on the effective of leadership because quality effort can get actual effect only with the recognition and support of the leadership. In supply chain circumstance, the core enterprise play as the leadership since it establishes the development strategy and operation targets of supply chain affect the actual efficiency and effectiveness of the quality effort of all the other members. At the same time, the core enterprise should foster more leaders of TQM in each layer of supply chain and make them take their responsibility zealously.

2.19.3 Involvement of People

The exertion of enthusiasm and creativity of all the employees is the precondition of the actual effect of quality management. In supply chain circumstance, an up-and-coming excelsior work atmosphere should be established to inspire the enthusiasm and creativity of the employees of all the members. Each employee should understand his/her role and responsibility in the supply chain system, solve the problems forwardly as mastership, and learn the principles, skills and technologies of TQM and ISO9000.

2.19.4 Process Management

The focus of modern quality view is the process quality management but not the product itself of traditional quality view. It is the requirement of the quality management system of ISO9004:2000 and the essential difference of modern and traditional quality view. In each step of supply chain, there are many correlative processes, such as procurement, logistics, production, inventory, selling, service, etc.
These processes have their own independent objectives and programs. There are usually conflicts among the objectives and programs.

2.19.5 System Management

The application of system approach in quality management is to view the quality management system as a big and holistic system, identify and manage the sub-systems respectively. Then, the coordinated effect and mutual promotion among the sub-systems will make the whole effect greater than the sum of the improvement of each sub-system and improve the validity and efficiency of the realization of final targets. In supply chain circumstance, enterprise should confirm the mutual dependence relationship among the processes in supply chain system, break the boundary among supply chain members, construct and integrate the processes in supply chain system. Then, many well operation sub-systems can be constructed to collocate the resources rationally among the sub-systems.

2.19.6 Continual Improvement

Continual improvement is one of the focuses of modern quality research and practice. Enterprise must improve the quality of product and service continually and reduce the cost to make customer satisfactory. In supply chain circumstance, the pressure of continual improvement is more and more pressing because the market competition is more and more hard. Not only the core enterprise but also the other members, such as suppliers, sellers, and logistics providers, must improve their product and service respectively so as to construct the continual improvement of products and services all over the supply chain process. Then, the continual, stable and harmonious ability of quality assurance can be established.

2.19.7 Mutually Beneficial Supplier Relationships

TQM authorities recommend that organizations work directly with raw material suppliers to ensure that their materials are of the highest quality possible. Currently, at least 50 percent of TQM organizations collaborate with their suppliers in some way to increase the quality of component parts. Often these organizations send out “quality action teams” to consult with their major suppliers. The objective is to help suppliers use TQM to analyze and improve their work processes. Suppliers can contribute to quality in a number of other ways. Therefore, the organization and its supplier are
mutually dependent. Maintaining the mutually beneficial relationships between them can improve the ability of creating value both of them. In supply chain circumstance, the product quality is performed and ensured by all the members of supply chain because the production, sales and service process must be performed by all the members. Simply stated, “The supply chain encompasses all of those activities associated with moving goods from the raw-materials stage through to the end user.”

2.20 Factual Approach to Decision Making

The sufficient and adequate data and information is the foundation of making right and effective decisions. Up to now, many enterprises have began to collect and deal with all kinds of data and information by utilizing many advanced information technology, e.g., electronic data interchange [EDI], MRP, ERP, point of sales systems [POS], Intranet/Extranet/Internet, so as to provide foundation for making effective decision. In supply chain circumstance, enterprise should collect data and information of not only itself but also the other members of supply chain to record and analyze the current operation situation of each member. Therefore, the potential problems in any step of supply chain can be found duly according to the results of data analysis. Then, the corresponding correct and timely decision can be made to avoid or rectify the problem.

2.21 Supply Chain Integration

General the purpose of supply chain management is described by Kaufman [1997, p. 14] as to being to “remove communication barriers and eliminate redundancies” through coordinating, monitoring and controlling processes. The integration of supply chains has been described by Clancy as: attempting to elevate the linkages within each component of the chain, [to facilitate] better decision making and to get all the pieces of the chain to interact in a more efficient way [and thus] create supply chain visibility and identify bottlenecks [Clancy, cited in Putzger, 1998, p. 55].

The main drivers of integration are listed by Handfield and Nichols [1999, p. 5] as:

1) The information revolution;
2) Increased levels of global competition creating a more demanding customer and demand driven markets; and
3) The emergence of new types of inter-organizational relationships.
They describe the three principal elements of an integrated supply chain model as being information systems [management of information and financial flows], inventory management [management of product and material flows], and supply chain relationships [management of relationships between trading partners].

The basis of integration can therefore be characterized by cooperation, collaboration, information sharing, trust, partnerships, shared technology, and a fundamental shift away from managing individual functional processes, to managing integrated chains of processes [Akkermans et al., 1999]. The extent of integration can begin with product design, and incorporate all steps leading to the ultimate sale of the item [Transportation and Distribution, 1998; Modern Materials Handling, 1998; Ballou et al., 2000]. It also includes all activities throughout the useful life of the product including service, reverse logistics and recycling [Carter and Ellram, 1998; Coleman and Austrian, 2000; Thomas and Griffin, 1996].

Both TQM and SCM offer unique frameworks to integrate participation and partnership, since they required participation from all internal functions and continuous collaboration with all external partners [Gimenez, 2004; Sohalk and Anderson, 1999; Dean and Bowen, 1994].

However, TQM focuses more on internal participation, where as SCM places more emphases on external partnerships.

2.21.1 Internal Participation

Lakhe and Mohanty [1994] referred to Oakland [1989]’s suggestion that the word “total” in TQM refers to every department and every person at every level in an organization. Although TQM requires involvement from customer and suppliers, it places more emphases on employee participation. The focus is on both internal primary and supportive functions in an organization’s value chain. In the TQM environment, all employees [including executive management] are treated as internal customers. If the internal customers are not satisfied, external customer satisfaction is difficult. Therefore, TQM emphasizes employee active and personal involvement and take ownership of the work which they are doing. By personal involvement and ownership the dedication towards the work is very high and company can achieve high standards in the end product [Khan, 2003].
2.21.2 External Partnership

SCM requires internal and external business process integration across the whole supply chain [Gimenez, 2004; Towill et al., 2002]. SCM effectiveness and efficiency depends significantly on the degree of integration [Chin et al., 2004; Bagchi and Skjoett-Larsen, 2005]. Therefore SCM aims to improve not only the performance of the individual organization but also that of the whole supply chain [Li et al., 2006]. This external focus may be due to the fact that the organization itself must work with the customer and the supplier within the same SCM framework [Holmberg, 2000; Golicic et al., 2002; Mentzer et al., 2001]. This is because most supply chains are too complex to achieve full integration of all business partners [Tan et al., 1998]. But now a day’s supply chains practices are designed in very simple and understandable way that each and every employee of the organization can understand and like to work as per the norms setup in the supply chain.

2.22 Supply Chain Operations Reference Model [SCOR]

SCOR Model is the product of Supply Chain council [SCC], an independent, nonprofit, global corporation with membership open to all companies and organisations interested in applying and advancing the state-of-art in supply chain management systems and practices. The SCOR model captures the Council’s consensus view of supply chain management. While much of the underlying content of the model has been used by practitioners for many years, the SCOR model provides a unique framework that links business process, metrics, best practices and technology framework that links business process, metrics, best practices and technology features into a unified structure to support communication among supply chain partners and to improve the effectiveness of supply chain management and related supply chain improvement activities. The model is based around four generic supply chain management functions of planning, purchasing, manufacturing and distribution.

SCOR is a top-down analytical method that helps organizations break out of the box and see where they fit into the SC. SCOR provides three-levels of process detail. Each level of detail assists a company in defining scope [Level 1], configuration or type of supply chain [Level 2], process element details, including performance attributes [Level 3]. Below level 3, companies decompose process elements and start
implementing specific supply chain management practices. It is at this stage that companies define practices to achieve a competitive advantage, and adapt to changing business conditions [Figure 2.1].

As a framework it also facilitates inter and intra supply chain collaboration, horizontal process integration, by explaining the relationships between processes [i.e., Plan-Source, Plan-Make, etc.]. It also can be used as a data input to completing an analysis of configuration alternatives [e.g., Level 2] such as: Make-to-Stock or Make-To-Order. SCOR is used to describe, measure, and evaluate supply chains in support of strategic planning and continuous improvement.

Although SCOR framework is widely used it has limitations that have to be taken into account. Cases in literature [Wang et al., 2005] show those limitations for applying SCOR in improving current inter firm processes regarding graphical presentation, gaps identifying, and none-defined business activities that are summarized below:

1) SCOR can only present business flow in between legal or geographical entities but not any matrix organization structure or the concept of „virtual enterprise.

2) SCOR is limited to the presentation of one single supply chain while most of the enterprises may be associated with multiple channels of markets and products.

3) The KPI of SCOR is not always available in the target firm, particular when it involves with cross-sites information.

4) Problems sometimes cannot be identified by KPI gaps such as information systems readiness.

Some essential activities are not defined in SCOR standard, for example,

1) Demand up-size and down-size from order changes, e.g., emergent orders or order cancelling.

2) The activities of collaborative design and customer relationships management are not defined in SCOR.
A number of supply chain modeling methods and management methodologies have been proposed to describe the supply chain from different aspects, such as process, structure and decision mechanism. Supply chain operations reference [SCOR] model was developed by the Supply Chain Council. It is intended to be a cross-industry standard in SCM process definition and configuration [Supply Chain Council, 1997, 2000]. It views the supply chain as a chain of processes. The models are purposefully designed to be configurable by accommodating flexible combinations of hierarchical
processes. SCOR is a concise reference model that mainly focuses on supply chain processes and process metrics.

2.23 Implementing Effective Supply Chain Management Strategies

Implementation of effective SCM strategies in the organization following steps should be taken care while the implementation process is under execution. The supply chain management system is based on the idea of less control and more supply chain partners – supply chain management is supposed to build up trust and collaboration between these supply chain partners. This trust and collaboration is supposed to help improve the amount of inventory that is produced and the amount of time it takes to produce inventory. It is the daily and constant application of supply chain management duties that will make sure that the system is continuously working and being implemented correctly

2.23.1 Manage Inventory Investment in the Chain

Each constituent of the supply chain desires to hold no more than its fair share of inventory. For instance, the distributor desires fewer inventories and would like to see inventory held by the manufacturer. As a result, the concept of vendor-managed inventory has become a trend in inventory management. This system allows the inventory to be pushed back to the vendor and as a result lowers the investment and risk for the other chain members [Donovan, 1997; Mayer, 1996].

As product life cycles are shortening, lower inventory investment in the chain has become important. Cycle times are being reduced as a result of the quick response inventory system. The quick response system improves customer service because the customer gets the right amount of product, when and where it is needed [May, 1994]. Quick response also serves to increase manufacturing inventory turns.

2.23.2 Establish Supplier Relationships

It is important to establish strategic partnerships with suppliers for a successful supply chain. Corporations have started to limit the number of suppliers they do business with by implementing vendor review programs. These programs strive to find suppliers with operational excellence so the customer can determine which supplier is
serving it better. The ability to have a closer customer/supplier relationship is very important because these suppliers are easier to work with.

With the evolution toward a sole supplier relationship, firms need full disclosure of information such as financial performance, gain sharing strategies, and plans for jointly designed work. They may establish a comparable culture and also implement compatible forecasting and information technology systems. This is because their suppliers must be able to link electronically into the customer's system to obtain shipping details, production schedules and any other needed information [Copacino, 1996; Coyle et al., 1996; Keller, 1995].

2.23.3 Increase Customer Responsiveness

To remain competitive, firms focus on improved supply chain efforts to enhance customer service through increased frequency of reliable product deliveries. Increasing demands on customer service levels is driving partnerships between customers and suppliers. The ability to serve their customers with higher levels of quality service, including speedier delivery of products, is vital to partnering efforts. Having a successful relationship with a supplier results in trust and the ability to be customer driven, customer intimate and customer focused [Willis, 1995].

2.23.4 Build a Competitive Advantage for the Channel

Achieving and maintaining competitive advantage in an industry is not an easy undertaking for a firm. Many competitive pressures force a firm to remain efficient. Supply chain management is seen by some as a competitive advantage for firms that employ the resources to implement the process. It also serves to increase the clout in the channel because these firms are recognized as leading edge and are treated with respect.

Attaining competitive advantage in the channel comes with top management support for decreased costs, waste management, and enhanced profits. Many firms want to push costs back to their supplier and take labor costs out of the system. These cost reducing tactics tend to increase the competitive efficiency of the entire supply chain.

Firms have become more market channel focused. They are observing how the entire channel’s activities affect the system operation. In recent times, the channel power has
shifted to the retailer. Retailer channel power in the distribution channel is driven by the shift to some large retail firms, such as Wal-Mart, Kmart, and Target. The large size of these retailers allows them the power to dictate exactly how they want their suppliers to do business with them. The uses of point of sales data and increased efficiency of distribution also have been instrumental in improving channel power and competitive advantage [Magretta, 1998; Robinson, 1998; Ross, 1996].

2.23.5 Introduce Supply Chain Management Solutions and Enabling Information Technology

Information is vital to effectively operating the supply chain. The communication capability of an enterprise is enhanced by an information technology system. However, information system compatibility among trading partners can limit the capability to exchange information. An improved information technology system that is user friendly, where partners in the channel have access to common databases that are updated in real-time.

The supply chain as a special class of network offers unique and creative ways of planning and management of complex interrelated systems. There is realization among its members that designing and implementing various sub-systems of POMS, such as materials planning, inventory management, capacity planning, logistics, and production systems utilizing supply chain philosophy, will lead to overall improvement in enterprise productivity [Lee and Billington, 1993]. Integrated production planning and control [IPPC] systems assume the role of coordinator of demand and production functions. IPPC is a combination of philosophies, concepts, and tools and techniques, to manage deviations in expectations of the demand and supply functions of a productive system. It is an integrated material-flow based information system, whose planning and control are based on feedback loop of control theory. Main approaches to IPPC are push, pull, and synchronous flow production systems.

2.24 Strategies for Solving the Supply Chain Problems

Firms deal with two types of flows material and information. The production game is exposing only the top layer of problems that manufacturing firms face today in managing these flows.
Functional silos within each company affect the flow of information and materials, just as multi-firms [echelons] do in the supply chain. Batch processing of information generates effects of the acceleration principle” within the organization. Distorted demand data and delayed information become commonplace, eliciting a reaction typical of purchasing personnel and production planners.

This reaction is referred to as the lead-time [or safety stock] syndrome and is illustrated in figure 2.2. The effect continues to escalate, leading up to the undesired capacity increase based on this condition. This capacity increase, however, is not without a corresponding cost increase.

Eventually, the overload is relieved since increased capacity floods the supply chain, causing the second effect from distorted demand data. This effect, labeled inventory reduction syndrome”, is illustrated in figure 2.3. It is the result of the organization addressing the excess inventory created by the first syndrome. Without process changes, these two syndromes feed each other in a continuous loop.

Ultimately, another silo is established in the organization. It is specifically chartered to run promotions in the hope of increasing market share, while targeting reduction in excess inventories. This action is also erroneous. The firm has now combined perpetual reductions in sales prices from the inventory reduction syndrome” with increasing production costs from the lead-time syndrome”.

In a growing market, the combination of these two effects is consumed by the growth in demand. Firms can survive and even flourish during this growth period in spite of the oscillating cycle that focuses on reducing inventory during one time period, while expediting product delivery regardless of cost during the next period. When the market experiences a plateau or a decline at this time, the organization can spiral itself right out of existence.

The proposed framework represents the impact of these syndromes in the supply chain as through-put, cycle time, inventory at various stages, and quality of decision making in conjunction with generic structural elements such as flexibility, coordination, synchronization, and standardization, to develop a waste-sensitized strategy mix.
The primary purpose in establishing supply chains is to minimize the flow of raw materials and finished products at every point in the pipeline in order to enhance productivity and cost savings [Cohen, 1996; Cooper and Ellram, 1993]. Successful supply chain ventures manage the following critical elements for parts [individual business unit, or a division/function], and/or the whole [the entire supply chain].
2.25 Latest Developments in Automotive Supply Chain

Reduction of time to market, switching from mass production to mass customisation and compression of product life cycles are trends forcing permanent changes to the way companies do business. Business drivers affecting supply chain management policies in sectors such as retailing and manufacturing include:

1) cost management, which covers cost reduction and efficiency/savings [Mehta, 2004; Olhager and Selldin, 2004];

2) constant change in customer needs [Coronado et al., 2002];

3) unpredictable, new business opportunities [Gunasekaran et al., 2001];

4) environmental sustainability [Turkay et al., 2004];

5) access to/adoption of IT resources [Ho and Lin, 2004];

6) access to/adoption of manufacturing technology [Khouja and Kumar, 2002];

7) performance and stabilization [Bullinger et al., 2002; Chan, 2003];

8) reduction or complete elimination of waste in business operations [Mason-Jones et al., 2000]; and

9) Slim profit margins [Munson et al., 2003].

The past decade has witnessed the consolidation of diverse supply chain management models. Retail and grocery supply chains have pioneered the use of vendor-managed inventory [VMI], efficient consumer response and collaborative planning, forecasting and replenishment initiatives. Electronics-computer-semiconductor supply chains have been re-designed to support efficient, build-to-order [BTO] product manufacturing and vehicle manufacturers have witnessed the advent and maturation of sequenced supply from first-tier suppliers on adjacent supplier parks. Material and cargo movements are being tracked using global positioning systems and third and fourth party logistics providers are coordinating the inter-modal, transportation of goods.

The adoption of BTO initiatives comes with a series of challenges. The performance of the supply chain is the key in determining the success of any BTO initiative.
Having a supply chain capable of dealing with BTO requirements is as important as having accurate product definition and quick-customisation response capabilities. For example, the adoption of inbound logistics solutions to support BTO initiatives requires the support of robust IT applications. Williamson et al. [2004] highlighted that inter-organisational information systems are used to integrate processes within a business and synchronize the operations of all partners in the supply chain. In the view of Ho and Lin [2004] new technologies such as web services, wireless applications and advanced software applications can help to facilitate supply chain collaboration.

2.26 Business Challenges in the Twenty-First Century

The information age competition has ushered in a new set of challenges for business competitiveness [Luftman, 1996].

These include:

2.26.1 Understanding Customers

There is no escaping the fact that the customer in today’s marketplace is more demanding, not just of product quality, but also of service. As more and more markets become in effect “commodity” markets, where the customer perceives little technical difference between competing offers, the need is for the creation of differential advantage through added value. Hence, it is increasingly becoming important to understand customers’ needs and wants and to translate these into a unique value-added business mission.

2.26.2 Managing Time Compression

Time is the primary competitive motive of business in the 1990s. This does not mean, however, that other motives such as cost, quality, and service can be ignored. In fact, these are prerequisites to sustain competitiveness. But the winning factor is provided by time-based competition, which becomes the highest priority to gain responsiveness and flexibility. Product life cycles are shorter than ever before, industrial customers and distributors require just-in-time deliveries, and end-users are ever more willing to accept a substitute product if their first choice is not instantly available.
2.26.3 Mastering Mass Customization

The driving force behind the importance of responsiveness and flexibility is the need and the wish to respond to virtually any customer request just in time. Mass customisation offers a viable solution. It involves the delivery of a wide variety of customised goods or services quickly and efficiently at low cost. The key to making mass customisation work is highly-skilled and autonomous workers, processes, and modular units, so that managers can co-ordinate and reconfigure these modules to meet customer specific customer request and demands. Mastering mass customisation is the step towards gaining a competitive edge and is driving new business models.

2.26.4 Undertaking Globalization

There is an increasing trend towards globalisation. Almost every sector of business is influenced by global forces due to globalisation. In the global business, materials and components are sourced worldwide, manufactured offshore and sold in many different countries, often with local customisation. The challenge for the global company, then, is to achieve the cost advantage of standardisation while still catering for the local demand for variety. This has given rise to intense competition blurring the boundaries between domestic and global markets.

Business, therefore, can no longer act as an isolated and independent entity in competitive world, the real test of competitiveness takes place in “international markets” [Garelli, 1997; Salcedo and Grackin, 2000]. There is a need to create value delivery systems that are more responsive to fast changing global markets and much more consistent, focused and reliable.

2.27 Organisational Commitment and Governance for Supply Chain Success

The key to achieving desired collaborative breakthroughs is to establish strong managerial commitment to SCM [Akkermans et al., 1999; Lummus et al., 1998]. Commitment must come from all levels of the organization as well as from key channel “partners.” Top management, all the way to the CEO, must endorse SCM initiatives and provide the necessary resources [Marien, 2000; Stalk et al., 1992]. Only the most senior levels of management can dedicate the resources and realign the incentives to develop true cross-functional capabilities. At the same time, lower-level managers and workers across a variety of functions who must implement the initiative
must buy into the SCM program or it cannot succeed [Blackwell and Blackwell, 1999; Bowersox and Closs, 2002; LaLonde, 2000; Tyndall, 1998].

Commitment must also be shared by channel members – even though they may not share fully in the rewards of a successful initiative [Thomas, 1999]. The cross-functional and inter-organizational nature of SCM makes broad-based commitment a prerequisite [Kuglin, 1998]. Establishing widespread commitment is a challenge few companies are prepared to overcome, but it is vital to build a governance infrastructure capable of cultivating collaboration [Fawcett and Magnan, 2002]. Therefore, our goal is to gauge managerial commitment to SCM and identify governance mechanisms that can enhance not only commitment but also the communication and collaboration that enable excellence.

While the specific roles and responsibilities of a governance council vary substantially, the members of the council typically meet in integration sessions to consider and evaluate proposals. Pros and cons are openly discussed as are potential impacts and possible problem areas. Once a proposal is completely understood and refined as necessary, its viability is thoroughly assessed. Projects deemed as viable are adopted and subsequently promoted. Political battles and resource issues should be addressed and dealt with by the governance council. When the council does its job well, implementation cycles for key supply chain initiatives are greatly reduced.

2.28 Partner Advisory Councils

Advisory councils can bridge emotional and strategic distances between a company and its supply chain partners. These councils are typically used as sounding boards for new ideas as well as for the dissemination of best practice. At some company’s adhoc and formal coordination meetings with partner companies complement the more structured councils.

One leading interview company has established both a “Supplier Advisory Council” and a “Customer Advisory Board” to help it work more closely key partners. The supplier council is composed of a dozen senior level company managers and 16 senior executives from highly valued suppliers. The advisory council meets quarterly and acts as a board of directors for the supply-base management process. The council engages and involves the supply base to actively critique and continuously improve
the supply acquisition process. The council evaluates new ideas and practices to assure that they make sense from the supplier’s perspective. Council feedback acts as an early warning system, helping the company avoid alienating key suppliers. The objective is to help the company become a “favored customer with the supply base.” The council also speeds the sharing of technology and best practices among the supply team. Finally, the council helps plan and participates in the annual supplier conference. In recent years, feedback from the supplier advisory council has led to the following:

1) earlier supplier involvement in product and process design, especially among the engineering teams;

2) better corporate-to-corporate communication;

3) a policy of using preferred suppliers first;

4) enhanced relationships via ERP/EDI/internet; and

5) Better forecast sharing.

Customer advisory boards are used in a similar fashion. Representatives from key customers are asked to participate as members of a board that meets together at least annually to provide insight into how the company can better meet vital customer needs. Products, services, and resource-sharing or role-shifting opportunities are the primary focus of these boards. Fewer companies engage their customers in such an advisory role than use supplier councils. It is often true that customers can be more difficult to enlist in such activities. We should point out that only a couple of the interview companies have instituted advisory councils comprised of senior-level managers from all three entities – the company, its customers, and its suppliers.

2.29 Senior-Level Supply Chain Executive

A final, but less often seen approach to overcoming the organizational gaps that distract from a customer orientation and diminish operational efficiency involves the creation of a senior executive supply chain position. Two titles were seen: Executive VP of Supply Chain and Executive VP of Order Fulfillment. In both cases, vice presidents from R&D, sourcing, operations, logistics, and marketing reported to the supply chain executive. The Executive VP of Supply Chain reports directly to the
CEO. The advantage of this reporting structure is that it ties together all of the value-added activities from product conceptualization to customer fulfillment. The entire process becomes visible to one person who is not only responsible for performance outcomes but also has the clout to cut through turf conflicts and see that needed resources are made available.

The perfect governance infrastructure – one that effectively bridges the gaps that persist in both modern corporations and global supply chains – has yet to emerge. However, leveraging strong core competencies through the use of cross-functional teams, governance councils, advisory boards, and an appropriate reporting structure promises to mitigate many of the challenges encountered in today’s supply chain world.

2.30 Attractiveness

In marketing and supply chain literature attraction is not a new term, but interpretation and understanding of the concept is slightly differentiated. The basic meaning of attraction is to cause interest, pull a company toward yours and, furthermore, have the ability to stay attractive to the other parties [Thibaut and Kelly, 1959; Blau, 1964; Ellegaard et al., 2003]. If the supplier or buyer is able to make it attractive to the other relational partner, it can attract the necessary top management attention, which might create greater performances and loyalty. Furthermore, to be an attractive partner the company can minimize relational cost, because the counterpart will act more proactively in the relationship if it finds the other part attractive [Ellegaard and Ritter, 2006; Cordon and Vollmann, 2002; Christiansen and Maltz, 2002].

Attraction is still a relatively unexplored concept in a commercial context but Blaus’ theoretical view has been used in relational management and marketing literature, where attraction has been viewed from a value and cost-reward perspective, where expected value, perceived trust and perceived dependency are important elements of the perceived attraction [Thibaut and Kelly, 1959; Blau, 1964; Kelly and Thibaut, 1978].

Ellegaard et al. [2003] and Ellegaard [2004] explore a new way to look upon attraction and the concept is viewed as a way to attract the best qualified suppliers in competition with other customers. Attractiveness is viewed from a cost-benefit point
and the same criteria are used, economically, resource and socially based, as in Harris et al. [2003], and furthermore attraction is viewed as a dynamic element, which is formed by the relationship and its surroundings. Ellegaard [2004] argues that attractiveness is based on present and future expectations in accordance with Halinen [1997] and states that attractiveness denotes the customer’s ability to be and stay attractive to its suppliers and thus build commitment and trust. The fundamental idea of attractiveness is to make the supplier follow the customer’s lead voluntarily, and furthermore, let the supplier be as much the deciding party as the customer, and perceived as an attractive customer the company can automatically influence the supplier to act according to the customer’s wishes [Ellegaard et al., 2003].

Hald and Vollmann [2007] explore attraction from both the buyer and seller perspective, and make a model that illustrates the different elements that influence attraction. They find that the mechanisms, which create dyadic partner attraction, are constructed by three major components, which are; perceived expected value, perceived trust and perceived dependence, which individually have a range of sub-dimensions.

### 2.31 Supply Chain Collaboration

Opportunities for collaboration among business partners will vary depending upon the organization’s prospective role in the supply chain. Collaboration enables partners to jointly gain a better understanding of future product demand and implement more realistic programmes to satisfy that demand. The three major types of collaborative relationships are depicted in Figure 2.4 and discussed below [Lapide, 1999].

![Figure 2.4: Collaborative Logistic Planning](image-url)
2.31.1 Manufacturing/Supplier Collaboration

Close collaboration among supply chain partners can be to align the parties and then enhance the value of the network's combined activities. Collaborating with suppliers, manufacturers will derive benefits in such key activities as new product development, order fulfillment, and capacity planning. Collaborative product development enabled by sharing and modifying design documents will help manufacturers develop products better and faster. Similarly, co-coordinating all tier-supplier production schedules will help ensure that future material needs are satisfied. This, in turn, results in improved order fulfillment and increased capacity utilization.

2.31.2 Manufacturer/Customer Collaboration

The collaborative opportunities between manufacturers and customers [such as wholesaler-distributors and retailers] center on demand planning and inventory replenishment. The focus is on jointly developing an understanding of demand at the point of consumption, followed by creation of a mutually agreed replenishment plan. This approach helps to ensure that consumer requirements are met efficiently. To collaborate on demand planning successfully, business partners need to share and modify each other's demand plans and forecasts electronically. Importantly, each partner needs to understand and electronically share its promotional plans. Once demand plans and forecasts are in place, replenishment plans designed to assume adequate product availability would be jointly developed.