CHAPTER - IV

Supply Chain Management in FMCG Industries.

4.1 Introduction:

Supply chain management was a term invented by Keith Oliver, a consultant belonging to the firm Booz Allen Hamilton, in the year 1982, to describe the overall process of planning, implementing and controlling what goes on at the supply chain in order to satisfy customers’ needs in a quick, efficient manner.

FMCG products are closely associated with direct end users. The influence of consumers related to choice, like and dislikes, demography, seasonality, brand, marketing etc. are peculiar. The volume of products, movements of goods is quite large in comparison with other type of products. Distribution channels are wide and complex in FMCG industries. Hence scope and role of supply chain is crucial considering financial aspect of organization. Turnaround of goods in FMCG industries are quite frequent, it is directly correlated with end user and measurements of system parameter are comparatively clear hence FMCG industries are chosen for study in particular.

Supply management is evolved through various phases in industry starting from traditional store keeping, purchasing, logistic, materials management, and integrated materials management to supply chain management. Its performance is measured through parameters and attributes like reliability, responsiveness, flexibility, cost and asset managements for better clarity and understanding of the function. Each of the parameters has its own attributes which are part and parcel of supply chain activities. The function is supported with resources like hardware, software, assets and manpower.

SCM professionals are one of the important resources to drive the system. As a result, today’s supply chain manager owes his success or failure purely to the possession or lack of certain key skills.
4.1.1 Definition:

Supply Chain Management is an essential aspect of business today. The idea is to apply a total systems approach to managing the entire flow of information, materials and services from raw materials suppliers through factories and warehouses to the end customers.

Consider how materials might flow from a company's suppliers, through the company's operations and then on to its customers. An increasingly popular perspective today is to view the flow of material from suppliers all the way to customers as a system to be managed. This perspective is commonly referred to as supply chain management. In its broadest sense, a supply chain refers to the way that materials flow through different organizations, starting with raw materials and ending with finished goods receipt to the customer.

Supply chain management is a function which encompasses clear accountability and responsibility for deliverables starting from customer’s customer to supplier’s supplier. It translates customer’s customer requirement and links through till vendor’s vendor. In other words, it is a linked set of resources and processes that begins with the sourcing of raw materials and extends through the delivery of the end items to final customer.

Figure: 4.1

Typical Supply Chain

- Integrated Supply chain
- Upstream suppliers
- Suppliers
- Your Company
- Distribution channels
- Customers
- Information flow sharing
Supply chain is a sequence of suppliers, warehouses, operations and retail outlets. Different companies may have different supply chains due to the nature of their operations and whether they are primarily a manufacturing operation or a service operation. Figure 4.2a illustrates a typical supply chain for a manufacturing organization and Figure 4.2b illustrates a typical supply chain for a service organization.

![Supply Chain for a Manufacturing Organization](image1)

**Figure 4.2 a.: Supply Chain for a Manufacturing Organization**

Source: Supply chain Management by Welingkar, P.P. 3

![Supply Chain for a Service Organization](image2)

**Figure 4.2 b.: Supply Chain for a Service Organization**

Source: Supply chain Management by Welingkar, P.P. 3

The concept of supply chain management (SCM) is getting rooted in industry. However, during the past 5-10 years, there has been an increased focus on SCM as a competitive weapon due to the significant effects that supply chain activities have on all elements of an organization's financial performance, including operating costs, revenue growth and asset management.
Supply chain management is a concept which involves the integration of value addition components in the supply, manufacturing and distribution processes, from the raw material, extraction stage right through the various transformation value addition processes, to the distribution and end user consumption. The objective is to maximize customer service, compress lead time and reduce inventory.

A truly integrated supply chain requires a massive commitment by all members of the chain. In other words there should be a mutual trusting mindset between all the supply chain partners. Supply chain management is defined by the Council of Logistics and Management as “The process of planning and controlling the efficient, cost effective flow and storage of raw materials, in process inventory, finished goods and related information from point of origin to point of consumption for the purpose of confirming to consumer requirements.”

Martin Christopher defines SCM as the management of upstream and downstream relationships with suppliers and consumers to deliver superior value to the customers at less cost to the supply chain as a whole.

Ellram defines SCM is an integrative approves to dealing with the planning and control of the materials flow from suppliers to end users.

A Supply Chain is defined as a set of organisations directly linked by one or more of the upstream and downstream flows of the products, Services, finances and information from a source to a customer. It consists of all the stages involved, directly or indirectly, in fulfilling a customer’s demand. It not only includes the manufacturer and suppliers, but also transporters, warehouses, retailers and customers themselves. Within an organization, the supply chain include, but are not limited to, new product development, marketing, operations, distribution, finance and customer service.

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Supply chain management\(^5\) (SCM) is the combination of art and science that goes into improving the way of an organisation finds the raw components it needs to make a product or service and deliver it to customers. The following are five basic components of SCM.

1. **Plan**: This is the strategic portion of SCM. Organisations need a strategy for managing all the resources that go toward meeting customer demand for their product or service. A big piece of SCM planning is developing a set of metric to monitor the supply chain so that it is efficient, costs less and delivers high quality and value to customers.

2. **Source**: Next, Organisations must choose suppliers to deliver the goods and services they need to create their product. Therefore, supply chain managers must develop a set of pricing, delivery and payment processes with suppliers and create metrics for monitoring and improving the relationships. And then, SCM managers can put together processes for managing their goods and services inventory, including receiving and verifying shipments, transferring them to the manufacturing facilities and authorizing supplier payments.

3. **Make**: This is the manufacturing step. Supply chain managers schedule the activities necessary for production, testing, packaging and preparation for delivery. This is the most metric-intensive portion of the supply chain—one where organisations are able to measure quality levels, production output and worker productivity.

4. **Deliver** : This is the part that many SCM insiders refer to as logistics, where organisations coordinate the receipt of orders from customers, develop a network of warehouses, pick carriers to get products to customers and set up an invoicing system to receive payments.

5. **Return**: This can be a problematic part of the supply chain for many organisations.

\(^5\) Internet Source - CIO Magazine's ABCs of Supply Chain Management, (http://www.cio.com/article/40940)
Supply chain planners have to create a responsive and flexible network for receiving defective and excess products back from their customers and supporting customers who have problems with delivered products.

4.1.2 Theories of Supply Chain Management:

Considering available literatures and prevailing practices in organizations, the concept and domain arena of supply chain management is studied by providing theoretical background for explaining the existence and the boundaries of supply chain management. Few authors such as Halldorsson⁶, Ketchen⁷ and Hult, Lavassani had tried to provide theoretical foundations for different areas related to supply chain with employing organizational theories. These theories include:

- Resource-based view (RBV) – this theory explains about resouces and its criticality to the function to establish control measure.
- Transaction Cost Analysis (TCA) – Under this theory, the supply chain activity are analyzed from involved transaction perspective. The associated cost are analyzed and reviewed.
- Knowledge-based view (KBV) – knowledge as emerged as business tool. This theory is explained with knowledge based perspective, leading to timely action for savings in the supply chain function.
- Strategic Choice Theory (SCT)
- Agency theory (AT)
- Institutional theory (InT)
- Systems Theory (ST) – Under this theory, SCM and its components are viewed from input – process – output–feedback model and it is optimized.
- Network Perspective (NP)

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4.2 Objectives of SCM:

Following are the objectives of supply chain Management:

1. To maximize the overall value generated. The value a supply chain generates is the difference between what the final product is worth to the customer and the effort the supply chain expends in filling the customer's request.

2. To achieve maximum supply chain profitability. Supply chain profitability is the total profit to be shared across all supply chain stages.

3. To reduce the supply chain costs to the minimum possible level.

4. To generate synergy among the supply chain components by ensuring reduction in communication gaps.

5. Motivate and encourage innovations and constant updation of application and knowledge.

6. To enhance company's top and bottom line and ultimately competitiveness through improved manufacturing and service capability, faster response to market and building healthy customer-supplier responsiveness.
4.3 Developments of SCM:

If we review evolution of SCM, no doubt, it is emerged from thankless support job to pride profit function. Solely, it holds worth of organization in kinds and services which decides values with time. Predominately it impact has on profitability which seems virtual but certain in real sense in times to come.

In industrialization era, activities are classified in task groups such as production, accounting, administration, planning, stores, purchase, warehousing, distribution, logistics etc. These silos of activities clustered to form functional management, later on given birth to materials management with optimizing functional expertise. It is passed through by adopting profession as approach to new business dimension of cost optimization. Added with IT support in competitive environment led to evolution of SCM concept. In other words, SCM started with the concept from delivering the right product to the right place at the right time and at right price. It evolved from traditional store keeping to purchasing, distribution, warehousing to materials management; logistics to integration of important functions with encompassing to emerge in the form of Supply Chain Management.

4.3.1 Development phases in SCM:

The practitioners, philosophers and academicians claim that SCM development has undergone in six major phases to reach to its current stature. These are so called era which are as follows.

1. Creation Era
2. Integration Era
3. Globalization Era
4. Specialization – Phase -1
5. Specialization – Phase -2
6. SCM 2.0

\[\text{Internet source}\] http://en.wikipedia.org/supplychainmanagement/development
1. The Creation Era:

It is assumed that it started in early 20th century but coined in early 1980’s by industry consultants. This Era driven by mass production and assembly line concept, need aroused due to large scale changes, re-engineering, downsizing driven by cost reduction programs.

2. Integration Era (From 1980 till early 21st century):

With the development of EDI systems led to Introduction of ERP. Further added to Internet and web based collaborative systems helped bringing world together on the working screen. Execution speed and time value added to business parameter in this era. This Era of SCM evaluation is characterized by both increasing value adding and cost reduction integration.

3. Globalization Era:

This Era characterized by Cross boundary trade to optimize competitive and comparative advantage by global sourcing, value adding and cost reduction through global sourcing, Examples oil availability, cheaper labor, technological upgradations with global benchmarking, and converting waste to wealth with global foot prints.

4. Specialization Era Phase 1 -- Outsourced manufacturing and distribution.

Specialization era focused on “Core competencies” leaded to specialization model for organization. Vertical integration becomes outdated. Organizational activities and functions are reviewed with value addition concept and non-value added activities are functions are outsourced to other organizations who possessed that activity/function as their core competence. Such organizations are considered as business partners. In this, company physical boundary is converted to virtual boundary. Suppliers / OEMs have to overview his operation with bigger perspective with wider WIP visibility and Vendor managed inventory.
5. **Specialization Era** Phase 2 – Supply chain management as a service

Specialization within the supply chain, simple transportation, warehouse and logistics management extended beyond with supply planning, collaboration, execution and performance management aspects. This is evolved to enhance overall performance and efficiency. Later supply chain support solutions like ASP (application service provider) model, On-Demand model to SaaS (Software as a service) model has led to specialization Era in totality.

6. **Supply Chain Management 2.0**:

This is built on Globalization and specialization emergence. SCM 2.0 encompasses specialization and evolved global advantages in processes, methods and tools. Complexity and speed of supply chain effected due to Global competition, rapid price fluctuations, short product life cycles, expanded specialization and talent scarcity etc. Hence SCM 2.0 leverages proven solutions designed to rapidly deliver results with the agility to quickly manage future change for continuous flexibility, value and success.

![Figure 4.3 - Phases in SCM](image)

**4.3.2 SCM Trend:**

SCM gone through from disparate functions of logistics, transportation, purchase, stores and warehouse management to a focused integration with visibility on cycle time reduction, integrated purchasing strategy, supplier as business partner,
supply base management, strategic alliances, link synchronization to an fully SCM. Its an corporate vision to drive business for excellence. Various approaches and styles in SCM trend are tabulated as:

**Table: 4.1 SCM Development Trend**

| Past                        | Present                              | Future                                                              |
|-----------------------------|--------------------------------------|                                                                    |
| 3. No data base.            | 3. Data Management – Available.      | 3. Web based data, Quick, flexible,Reliable,Accessible –any time any where |

As SCM now fully evolved and well accepted a powerful function of business transformation which brings value to the organization and decides on profitability. Hence it considered as significant function on survival of organization foot prints.
4.4 Overview of Supply Chain Management:

A supply chain consists of all stages involved, directly or indirectly, in fulfilling a customer’s request. It not only includes the manufacturer and suppliers, but also transporters, warehouses, retailers and customers. Within a manufacturing organization, the supply chain includes functions such as new product development, marketing, operations, distribution, finance and customer service.

A typical supply chain may involve the following stages:

- Customers
- Retailers
- Wholesalers/distributors
- Manufacturers and
- Component/raw material suppliers

4.4.1 Activities in Supply Chain Management:

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 Management 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

Strategic:

1. Strategic network optimization, including the number, location, and size of warehouses, distribution centers, and facilities.
2. 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.
3. Product lifecycle management, so that new and existing products can be optimally integrated into the supply chain and capacity management.
4. Information Technology infrastructure, to support supply chain operations

\(^9\) Internet source–http://en.wikipedia.org/supplychainmanagement/#activities-2functions
5. Where-to-make and what-to-make-or-buy decisions.
6. Aligning overall organizational strategy with supply strategy.

**Tactical:**

1. Sourcing contracts and other purchasing decisions.
2. Production decisions, including contracting, scheduling, and planning process definition.
3. Inventory decisions, including quantity, location, and quality of inventory.
4. Transportation strategy, including frequency, routes, and contracting.
5. Benchmarking of all operations against competitors and implementation of best practices throughout the enterprise.
6. Milestone payments.
7. Focus on customer demand.

**Operational:**

1. Daily production and distribution planning, including all nodes in the supply chain.
2. Production scheduling for each manufacturing facility in the supply chain (minute by minute).
3. Demand planning and forecasting, coordinating the demand forecast of all customers and sharing the forecast with all suppliers.
4. Sourcing planning, including current inventory and forecast demand, in collaboration with all suppliers.
5. Inbound operations, including transportation from suppliers and receiving inventory.
6. Production operations, including the consumption of materials and flow of finished goods.
7. Outbound operations, including all fulfillment activities and transportation to customers.
8. Order promising, accounting for all constraints in the supply chain, including all suppliers, manufacturing facilities, distribution centers, and other customers.
4.4.2 Functions involved in supply chain management:

Few important significant functions involved which are part of supply chain management are planning, purchasing, stores management, warehousing and logistics. These functions form the framework for studying the nature and scope of supply chain management.

1. Planning
2. Purchasing
3. Store Keeping
4. Warehousing
5. Logistics

1. Planning:

A Plan is a predetermined course of action designed to facilitate completion of a particular task. Consequently Planning focuses on future. It is based on certain facts, some assumptions, and forecasts. Planning & control forms the core of managerial function. Hence material planning and budgeting is given the prominent place in materials management setup. In the context of supply chain management, the planning is to be done for strategic decisions such as import policy, foreign exchange availability, credit squeeze, inventory for working capital, working out delivery schedules etc. The major categories of planning following in an organisation are

a. Capacity Planning
b. Material requirement planning
c. Sales planning
d. Production Planning
e. Distribution planning

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10 Internet source - A.K.Chitale, R.C.Gupta, “Materials Management–Text & Cases” (http://books.google.co.in/books?id=dgZJehk6Et8C&pg=PA103&dq=stores+management&hl=en&sa=X&ei=Vj5VU5mOJKunsATHmYGoCQ&ved=0CEcQ6AEwBzgK#v=onepage&q=stores%20management&f=false)
a. **Capacity Planning:**

Capacity Planning is a done to access capacities at various stages of operations and storage locations. This is done with the objective to review, understand bottleneck, balancing of capacities and know utilisation level in manufacturing system. It also helps to decide about when and how capacity upgradation can be done in line with market requirement.

b. **Material requirement Planning:**

Material requirement planning is the scientific way of determining requirement of raw materials, components, spares and other items that go into manufacturing the finished goods. Some of the macro factors (external factors) which affect the material planning are price trends, business cycles, government policies, taxations etc. At the Micro level, the affecting factors are organisation’s own objectives & policies, plant capacity utilization, rejection rates, lead times, inventory levels, working capital, seasonality of products etc.

Material planning can be used to access organizations requirements for different planning horizons. Normally MRP is done for quarterly basis.

c. **Sales Planning**

Sales plans are prepared on basis contracts and commitment with customers, past trends and future predications with market assumptions. Sales Plans is driving document for production and material planning. Normally it is annual events with rolling forecast on 3 to 5 year horizon.

d. **Production Planning**

Production Planning is done on the basis of sales plan and material availability. This is done for a rolling quarter on monthly basis. It is performed as one month firmed and next two months rolling basis.

Organization is focusing on modern manufacturing system to improve the cycle time reduction, set-up time reduction, inventory reduction, reducing the rejection level with Zero defect concept, improving the material yield etc.
e. Distribution planning

This is very critical aspect in FMCG industries to ensure availability of products all the time at the same time inventory should not be high. In this aspect coordinate warehousing, logistic and sales management part.

Planning being strategic function of SCM. Few strategies adopted by supply chain professional in organizations are as listed below.

Make or Buy
Outsourcing
SCM Specialized software

2. Purchasing and Procurement:

Purchasing function, in a business environment, is one of the most critical functions as it provides the input for the organisation to convert into output. Materials today are lifeblood of industry. They must be available at the proper time, in the proper quantity, at the proper place, and the proper price. Company costs and company profits are greatly affected by them as normally, a manufacturing organisation spends nearly 50 percent of its revenue in purchasing.

Purchasing function is a function commonly seen in all those organisations that undertake purchasing activities. Purchase department is a unit of an organisation that performs purchasing function. The purchasing function is usually performed by a specialised and centralised purchasing department, directed by an efficient manager to achieve the performance in an economical manner.

Purchasing is responsible for spending nearly half of a company's income for buying the input materials. Obviously, any saving achieved by it results into direct saving for the company and all such savings are a company's profit. Going by a thumb rule "even one percent saving achieved in purchasing results in five percent profit for any organisation".

Procurement verses Purchasing:

In the broadest sense procurement includes the entire process by which all classes of resources (people, materials, facilities and services) for a particular project
are obtained. Since purchasing is a unique function, it differs a bit from procurement in the sense that while procurement, with the same objective has a wider domain, purchasing with the same objective is included in it!

The procurement concept comprised in addition to purchasing the acquisition by a manufacturer of his necessary primary materials, supplies, equipment and so forth, by any method whatsoever. Thus, procurement includes extraction from owned mines, or forests, cultivation of agricultural lands, manufacture in owned plants and purchase. Procurement, therefore, covers wider areas and may include the duties performed by purchasing as well as such additional functions of material supervision and management as inventory control, traffic, receiving, incoming inspection and salvage operations.

**Objectives of Purchasing:**

The classical definition of objectives of purchasing is to buy materials and services of the right quality, in the right quantity, at the right place, from the right source and at the right time. However, in general management parlance the objectives of purchasing are:

1. To support company operations with an uninterrupted flow of materials and services.
2. To buy competitively and wisely
3. To help keep a minimum Inventory
4. To develop reliable alternate sources of supply
5. To develop good vendor relationship and a good continuing supplier relationship
6. To achieve maximum integration with the other departments of the firm
7. To train and develop highly competent personnel who are motivated to make the firm as well as their department succeed
8. To develop policies and procedures which permit accomplishment of the preceding seven objectives at the lowest reasonable operating cost.

The basic objective, in pure practical terms is, of course, to derive the maximum value for each unit of currency spent in buying. Purchasing is no doubt a vast subject

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and as the competition among the firms grows this function of business is expected to see a lot of evolution.

**Types of Purchasing:**

Considering the nature of business an organisation has there could be different approaches and hence Purchasing can be any of these types:

a. Forward Buying  
b. Tender Buying  
c. Strategic Buying  
d. Systems Contracting  
e. Rate Contract  
f. Blanket Order

**Purchasing System (Steps In Purchasing) :**

1. Get Requirement from User Department.  
2. Send the INQUIRY to the Vendors.  
3. Get the QUOTATIONS from Vendors.  
4. Make Comparative Statement.  
5. Negotiate; Fix the Price and Terms & Conditions.  
6. Place the ORDER to the right Vendor.  
7. Follow up with Vendor.  
8. Receipts & Inspection.  
9. Storage & Record keeping.  
10. Invoice & Payment.

Figure 4.4: Purchasing interfaces with functional areas of the firm and with suppliers
JIT Purchasing is one of a recent tool and technique in purchasing to save on ordering cost and inventory holding.

**JIT purchasing:**

Just-in-time manufacturing technique requires just-in-time purchasing. The easy parts of JIT purchasing include having to deal with fewer suppliers and forming long-term relationships with suppliers who emphasize co-operative spirit than low price. On-time delivery is usually the primary need of JIT manufacturers, followed by small lot sizes.

Good suppliers are a vital link in the supply chain. Late deliveries of parts or materials or missing or defective items can disrupt production schedules, increase inventory costs and cause late deliveries of end products.

Following SCM strategies are used in an organization in Purchasing.

- Negotiations
- Reverse auctions
- JIT
- Green Purchasing

### 3. Stores Management:

Stores occupy an important place in the operations of industrial and business establishments. It provides continuous service to manufacturing process and have direct interactions in day to day operations. Store is a place where all types of materials are stored.

Organization is a means to achieve desired objectives in an efficient and economical manner. To organize a business means providing it with everything necessary for its functioning. It is assigning of duties, responsibilities and establishing co-ordination in all the resources of the concerns. Organization is an indispensable mean to the good management and a wrong structure can seriously impair business or even destroy it. Thus organization of stores consists the following steps:

1. Identification and grouping of work.
2. Defining and delegating responsibility and authority.
3. Establishing structural relationship so as to ensure efforts are co-ordinated.
Objectives of stores:

In an organization, stores department in mainly designed to provide staff activity in the production of goods & services. The main objective of stores activity is to services to the operative functions in the most of economical manner.

a. Ensuring uninterrupted service to production by continuous material availability.
b. Maintaining value of materials
c. Accuracy of Stock available
d. Services to user departments
e. Establishing co-ordination with other departments
f. Time actions on Non Moving, Slow moving and obsolete stock.
g. Generating MIS

The main Functions of Stores:

The storekeeper occupies important place in an organization. He is the person who keeps stores in order and handles all the materials efficiently. The following are main functions of stores

a. Identification of Materials
b. Receipt of Materials
c. Storage
d. Inspection
e. Material verification, stock taking
f. Issues from stores
g. Protection of materials
h. Inventory controls
i. MIS/ Reports

Features of Good Stores Keeping:

The success of good store depends on how it provides economy of time, employees and expenses. The true yardstick of judging is to find how smoothly production department runs. Scientific stores should have following features

a. Location of Store
b. Layout of store
c. Use of IT  
d. Classification & codification of materials  
e. Preservation of materials  
f. Use of material handling equipments  
g. Physical verification of stocks  
h. Visible Stores management

**Location of Stores:**

The location of stores depends on volume of material and type of goods to be stored. The common practice is to locate the stores near the consuming departments. The following factors should be considered while setting or selecting the site:

a. Proximity with the user department  
b. Security considerations  
c. Type of materials being stored  
d. Ease of transport  
e. Good Material control  
f. Scope of future expansion

**Inventory Control:**

One of important function of supply-chain management is to control inventory by managing the flow of materials. In a manufacturing organization, there is an inward flow of input materials such as raw materials, component parts, office supplies and consumables to facilitate the manufacturing process. The rate of production depends on the demand (customer orders) for the finished goods. Another possible outward flow is that of scrap generated in the conversion process and defective products produced and rejected. Together, the rate of input and output flows determines the level of usable inventory (cushion against stock out of input materials). Firms use total quality management to reduce defective materials, the larger the scrap flows, the larger will be the input flow of materials required for a given level of output. Inventories may be held in the form of raw materials and bought out components, work-in-process (WIP) and finished goods.
Inventory is defined as stock of materials in the organization at various stage, viz. finished goods, raw materials, packaging materials, work in progress, consumables, engineering spares which is to be kept in stock. It is said inventory is nothing but money in kind.

Inventory management\(^\text{12}\) is essential to keep supply chain costs low. Strategic role of inventory is to reduce the gap between demand and supply. However Excessive inventory adds to unproductive costs. Depending upon the desired service level, lead time and the demand variability an optimum level of safety stock can be decided.

Types of inventories
a. Raw Materials and components
b. Packaging materials
c. Spares and stores
d. Consumables and other miscellaneous items

In case of multi-location manufacturing, in order to optimize inventory, organization starts focusing on the central planning system based on the customer’s requirement allot to different plant and reviewing every month for the next month firm requirements and further two months tentative requirement to focus on the inventory.

The monthly plan has been further fine-tuned to identity the Runner, Repeater and Stranger sizes to run the manufacturing set up for the runner sizes continuously, repeater sizes once in a month and stranger sizes once in three months to improve the efficiency of the plant and convert the semi finish components to finish goods. Further the outsourced turned components are been monitored with the supplier to produce as and required and supply just in time to avoid the OSP (Outside Processing) component inventory.

Organizations\(^\text{13}\) hold inventory for two main reasons, to reduce cost and improve customer service. The motivation for each differs as organization balance

\(^{12}\) Dr.V.K.Gupta, “Sustained Competitiveness through supply chain optimization”, MMR, Volume 7, Issue -6, April 2012 pp 5.
\(^{13}\) Frank Dooley – “Logistics, Inventory Control and Supply Chain Management” Materials Management review, Volume 9, Issue 3, January 2013, PP 4 to 7
the problem of having too much inventory versus having too little inventory. A common perception and experience is that supply chain leads to cost savings, largely through reductions in inventory. Inventory costs have fallen by about 60 percent since 1982, while transportation cost have fallen by 20%, such cost saving have lead many to pursue inventory reduction strategies in supply chain. To develop most effective logistics strategy, an organization must understand the nature of product demand, inventory cost and supply chain capabilities.

Organizations use one of three approaches to manage inventory. First most retailers use an inventory control approach, monitoring inventory levels by items, second manufacturers are typically more concerned with production scheduling and use flow management to manage inventories. Third, a number of organization (processing raw materials or in extractive industries) do not actively manage inventories.

Inventory cost:

Different models are used to manage inventory for products that are continually available (like milk) or products available for limited time (like seed). The Economic order Quantity (EOQ) model determines the least cost level of inventory to carry, as well as cost. Figure 4.5 represent economic order quantity graphically. News Vendor models are used for products only available for single period.

![Economic Order Quantity](image)

Figure: 4.5 – Economic Order Quantity.
Inventory carrying cost falls in two three classes,
1. Carrying cost of regular inventory and safety stocks
2. Ordering or set up cost
3. Stock out cost

Inventory control system balances the above cost.

Following SCM strategies are used in an organization in stores for inventory analysis and control.

Inventory Analysis\[14\] and control:

Table 4.2 Inventory Analysis

<table>
<thead>
<tr>
<th>No.</th>
<th>Inventory Classification</th>
<th>Basis</th>
<th>Main Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ABC (Always Better Control)</td>
<td>Value of Consumption</td>
<td>To control raw material components and work in progress inventories in the normal course of business.</td>
</tr>
<tr>
<td>2</td>
<td>HML (High,Medium,Low)</td>
<td>Unit Price of the material</td>
<td>Mainly to control purchases.</td>
</tr>
<tr>
<td>3</td>
<td>XYZ</td>
<td>Value of items in storage</td>
<td>To review the inventories and their uses at scheduled intervals.</td>
</tr>
<tr>
<td>4</td>
<td>VED (Vital,Essential,Desirable)</td>
<td>Criticality of the components</td>
<td>To determine the stocking levels of spare parts.</td>
</tr>
<tr>
<td>5</td>
<td>FSN (Fast-Slow-Non Moving)</td>
<td>Consumption pattern of the items</td>
<td>To control obsolescence.</td>
</tr>
<tr>
<td>6</td>
<td>SDE (Scarce,Difficult,Easy to obtain)</td>
<td>Problem faced in procurement</td>
<td>Lead time analysis and purchasing strategies.</td>
</tr>
<tr>
<td>7</td>
<td>GOLF (Government, Ordinary, Local, Foreign sources)</td>
<td>Sources of material</td>
<td>Procurement strategies</td>
</tr>
<tr>
<td>8</td>
<td>SOS (Seasonal, Off seasonal)</td>
<td>Nature of supplies</td>
<td>Procurement / Holding strategies for seasonal items like agricultural products.</td>
</tr>
</tbody>
</table>

Non Moving Slow Moving and obsolete item report
Scrap Reconciliation.

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\[14\] P.C.Sharma, Materials Management, Kiab Mahal, Allahabad, 1984, pp 56
4. Warehousing:

Warehouses are a key link in logistics chain, providing a proper environment for storing goods and materials and supplying the product to the customer just in time. Increasing demand in the outsourcing activities in India, every customer look for the supplier having warehouse close to their manufacturing unit and get the material in every two hours directly to their assembly line.

Contemporary developments in warehousing:
1. Distribution Requirement Planning (DRP)
2. Bar Coding.
3. Electronic Data Interchange (EDI)

1. Distribution Requirement Planning (DRP):

Distribution Requirement Planning (DRP) is a system for inventory management and distribution planning. It extends the concept of material requirement planning (MRP I) to multi-echelon warehouse inventories starting with the demand at the end of the channel and working that back through the warehouse system to obtain time phased replenishment schedule for moving inventories through warehouse network. DRP is used to plan and coordinate transportation, warehousing, workers, equipment and financial flows.

2. Bar Coding

Bar coding is found to be essential requirement of warehouse and stores management. A bar code is a machine readable code consisting of series of bars and spaces printed in defined ratios. As the same way our eye sees the writing on any page, a scanner sees a bar code and converts the visual image into an electrical signal. The information encoded in this electrical signal is then processed by a decoder as like information from our eyes is processed by our brain.

In today’s rapidly changing business environment, it is necessary that the organization keeps up with current development in the market. Quality, reliability, innovation and customer’s service are prime priorities and objectives in almost all
Bar coding helps in fulfilling these objectives. Today, bar coding is the accepted method of data entry. Everybody have experienced a massive boom in the computerization, in almost all field of our life, be it any type of organization, especially in inventory management. It is estimated that 90 percent of all medium to large organization are using are using inventory control system to keep the track of their stocks.

Typical Bar Coding System consists of
1. Reading Process
2. Printing Process

Reading Process can be separated into following three processes.
1. Scanning device
2. Decoding device
3. Interface device

All the above three modules can be combined in to one typical device or can be split into two. However each module is important and sequential into the reading process.

1. Scanning Device :

The Scanner Serves as the eye of the Bar Code system by converting a visual image into electrical signal. Proper selection of scanner is dependent upon
a. Scanner’s compatibility with the application
b. The label required for scanning purpose.
c. The Decoder

A smooth scan at a consistent speed and proper angle of lift is very essential.

2. Decoding Device

The decodes serves as a brain of the bar code system by taking the electrical signal from the scanner (eye) and converting the timing relationships of bars and spaces into an electronic representation of the information to be encoded.
3. Interface Device

Any peripheral system such as bar code system requires a link or interface to the computer. Computer requires a specified communication protocol. Application will determine method of communication like direct, through modem, through a system controller. All the parts of Bar Code System must interact properly for a successful bar coding. The scanner must interact properly for a successful operation. The scanner must be compatible with both the decoder and the label and the operator must be properly instructed.

Following SCM strategies are used in an organization in warehousing.
Barcode
RFID
Use of vertical space

5. Logistics:

From the place of procurement to the place of consumption, Logistics is the management of the flow of goods between the point of origin and the point of consumption in order to meet customer’s requirements. The resources to be managed in logistics can include physical items such as food, materials, animals, equipment and liquids. The logistics of physical items usually involves the integration of information flow, material handling, production, packaging, inventory, transportation, warehousing, and often security. The minimization of the use of resources is a common motivation in logistics for import and export.

Logistics Management refers to designing, developing, producing and operating an integrated system which responds to customers expectations by making available the required quantity with required quality as and when required to offer best possible customer service at the least possible cost.

Logistics is an activity of managing total flow of materials from the beginning i.e. from the flow of raw material to production and flow of finished product to the consumer. It includes inward movement of materials from sources as well as distribution – outward movement of products from manufactures to consumers. It
excludes other matters connected with distribution such as marketing strategies, customer preference surveys, advertisements etc.

Logistics refers to the movement of materials within a production facility, the shipment of incoming materials from suppliers and the shipment of outgoing products to customers. Materials include all the physical items that are used in the production process such as raw materials, parts, components, consumables supplies, fuel, equipment, tools, and office supplies and so on.

The major features of Logistics Management are:

a. It ensures a smooth flow of all types of goods such as raw materials, finished goods.
b. It has ability to meet customer expectations & requirement of goods
c. It ensure delivery of quality product
d. It is an integration of various management functions for optimization of resources
e. It enhances profitability and productivity

Definition:

Logistics Management can be defined as the process of planning, implementing and controlling the efficient and effective flow of and storage of goods, services and related information from point of origin to point of consumption for the purpose of conforming to customer requirement. Logistics is not confined to manufacturing operations alone. It is relevant to all enterprises including government institutions such as hospitals and service organizations such as retailers, banks and financial service organizations.

Objective:

The basic objective of good logistics system can be defined as,” to get right goods or services to the right place at the right time in right condition at the right cost.” Logistics depends upon natural, human, financial and information resources for inputs. Computer tracking of shipments (using global positioning systems) often helps to maintain knowledge of the current status of shipments as well to provide other up-to-date information on costs and schedules.
Logistic decision - Evaluating Shipping Alternatives:

A situation that arises frequently in some businesses is making a choice between quicker (but more expensive) shipping alternatives such as overnight and slower but cheaper alternatives. In some instances, there is an overriding factor present that justifies sending a shipment by the quickest means possible so that there is little or no choice involved. However, in many instances urgency is not the primary consideration, so there is a choice. The decision in such cases often focuses on the cost savings of slower alternatives versus the increased holding costs that would result from using slower alternatives.

Innovations in Logistics:

New developments are continually affecting logistics. Piggyback rail shipments, truck trailers on ships and other unique shipping methods are examples of hybrids that have resulted in great freight savings. Lighter weight shipping containers, unitized loads, consolidated shipments, deregulation of the trucking and airfreight industries and fluctuating fuel costs are examples of developments that are affecting logistics today. Computers facilitate availability of up-to-date information on the status of each shipment. Also in complicated distribution problems, the computers can be used to plan better networks of shipping methods.

The activities must be coordinated well together in order to achieve the least total logistics cost. Trade-offs exist that increase the total cost if only one of the activities is optimized. For example, full truckload (FTL) rates are more economical on a cost per pallet basis than less than truckload (LTL) shipments. If, however, a full truckload of a product is ordered to reduce transportation costs there will be an increase in inventory holding costs which may increase total logistics costs. It is therefore imperative to take a systems approach when planning logistical activities. This trade-offs are key to developing the most efficient and effective Logistics and SCM strategy.

Organization set up a team with members from all plants to focus on the economy of transporting material between the plants, warehouses, dealers and to the end customer tracking the need of the customer.
Logistic: Increasing outsourcing activities and multi plant location, the material and component movement increased lead to complex situation to monitor and optimize the logistic cost.

Following SCM strategies are used in an organization in logistics.

3PLs
Total logistic Cost
Tracking of consignments
Near to OEM.

Logistic contains transportation. Transportation cost\textsuperscript{15} is a significant part of the supply chain cost. Due to challenges of infra-structure, in India, transportation cost and time tend to be much higher the rest of the world, especially the developed countries. First step is in this direction is to bring the supplier closer to the point of consumption or demand. Vendor parks set up leading OEMs are good example, where overall need for transportation has been reduced. In addition, due to demand for a very large variety in low volume, companies are forced to take smaller lots and therefore need variety of parts in smaller numbers. In order to keep inventory low and also reduce overall transportation costs, companies are engaging local 3\textsuperscript{rd} party logistics provider to run a milk round service for sending parts more frequently in smaller quantity to OEMs.

The road transport sector\textsuperscript{16} in India has expanded in 50 years after independence both in terms of spread and capacity. Today about 65 percent of the goods are carried by road transportation in country, making road transportation the prime mode of transportation. The contribution of road transportation to GDP is 5 percent while road movement is preferred over rail still road movement has its own share of issues. These includes, inadequate road network coverage, poor road quality, motorable roads are less than 10 percent of the total road network, express way network will take time to develop and most of the national highways are still in form of single road in many stretches reducing their capacity to handle large traffic roads, multiple checkpoints, poor conditions of trucks, high in fuel prices.

\textsuperscript{15} Dr.V.K.Gupta, “Sustained Competitiveness through supply chain optimization”, MMR, Volume-7, Issue-6, April 2012 pp 5.
Warehousing cost is approximately 20 to 25 percent of total logistics costs. Despite this, the state of warehousing in India is not very good. Most of the warehouses are traditional with sizes of less than 10,000 sqft. Most of the owners are small to mid-size entrepreneurs with limited investment capacity. Large warehousing owners are government agencies which largely focus on food grain storage. Most of these warehouses are not leak proof, equipped with security system, racking facilities and other facilities.

The Indian logistics sector, cost accounts for 13 percent of GDP. This is much higher than that in the US (9 percent) Europe (10 percent) and Japan (11 percent) but lower than in China (18 percent). Inefficient logistics results in inflation, scarcity of goods, low competency and financial well-being of individual. The growth of Indian economy in coming decades is likely to be driven by increased activity in manufacturing and retail sector in which logistics have to play a pivotal role by providing value enabling solutions.

4.5 Supply Chain Performance Parameters:

In order to quantify and measure performance of supply chain, the parameters or key performance indicators are to be defined and measured. On the basis of functions and activities and role of supply chain configurations, parameters can be broadly classified as below.

4.5.1 Supply chain reliability:

Reliability of supply chain can be defined with indicators like Sales Forecast Accuracy, Compliance to production plan – Volume pack reliability and brand pack reliability, Measuring Deliveries – On time in full (OTIF), Line stoppage on account of material shortages etc.

4.5.2 Supply chain responsiveness:

Responsiveness is the ability of supply chain to respond rapidly to meet the unpredictable demand, both in terms of volume and product mix. With the rapid
changing industrial environment, responsiveness has become not only the linchpin of an organization to competitive success but also a key to survival.

Responsiveness of supply chain can be defined with indicators like Procurement lead time, level of Finished Goods Stock, Raw material and Packaging Materials Inventory Holding, Freshness Index of finished goods, Service level to customer requirement - Order to Dispatch time etc.

4.5.3 Supply chain flexibility:

Flexibility of supply chain is defined with parameters like Plan change absorption ratio (Internal capacity flexibility 80%-120%), Supplier Response to urgent order, Time taken for New Development, Co-operation from Key strategic vendors etc.

4.5.4 Supply chain cost:

Supply chain cost is nothing but cost and expenses involved in managing supply chain components at the same time opportunity lost cost or cost involved in optimizing supply chain activities. Supply chain cost can be defined with the parameters like carrying cost of Non and slow moving items, opportunity cost of Obsolete items, the obsoletion may be due to design change, legal change, product discontinuation, human error, technological error etc., Hidden Cost like detention Demurrages of consignments, Pilferage in transit or storage, theft, shrinkage etc. Total logistic cost, Warehousing cost, Raw material and Packaging Stock Aging, Scrap reconciliation etc.

4.5.5 Supply Chain Asset Management:

Managing supply chain activities, equipment and tools are required. Managing such assets in terms of extent and utilization of assets economically are key performance indicators of SCM. These could be Material Handling Equipment Utilization, IT Tools Application, Third party Services, Returnable material Management (Crates /Pallets /Boxes etc.), Usage of IT application and software packages is also important aspect of supply chain configuration.
4.6 Supply chain Software:

Supply chain Management supported with information technology tools are called as Supply chain management software.

![Supplier Web Communication IT Infrastructure]

Figure 4.6: Information Technology Application and SCM software.

These are tools or modules used in executing supply chain transactions, managing supplier relationships and controlling associated business processes.

- Information: Integration of and other processes through the supply chain to share valuable information, including demand signals, forecasts, inventory, transportation, and potential collaboration etc.
- Inventory Management: Quantity and location of inventory including raw materials, work-in-progress (WIP) and finished goods.
- Cash-Flow: Arranging the payment terms and the methodologies for exchanging funds across entities within the supply chain.
- Supply chain execution is managing and coordinating the movement of materials, information and funds across the supply chain. The flow is bi-directional.

4.6.1 Scope of supply chain management software:

Supply chain management software is possibly the most fractured group of software applications. Each of the five major supply chain functions outlined comprise of dozens of specific tasks, many of which have their own specific software. Some
vendors have assembled many of these different chunks of software together under a single roof, but no one has a complete package that is right for every company. For example, most companies need to track demand, supply, manufacturing status, logistics (i.e. where things are in the supply chain), and distribution. They also need to share data with supply chain partners at an ever increasing rate. While products from large ERP vendors like SAP's Advanced Planner and Optimizer (APO) can perform many or all of these tasks, because each industry's supply chain has a unique set of challenges, many companies decide to go with targeted best of breed products instead, even if some integration is an inevitable consequence.

It's worth mentioning that if the information entered into a demand forecasting application is not accurate, then you will get an inaccurate forecast. Similarly, if employees bypass the supply chain systems and try to manage things manually (using the fax machine or spreadsheets), then even the most expensive systems will provide an incomplete picture of what is happening in a company's supply chain.

4.6.2 Objective supply chain management software:

Before the Internet came along, the aspirations of supply chain software devotees were limited to improving their ability to predict demand from customers and make their own supply chains run more smoothly. But the cheap, ubiquitous nature of the Internet, along with its simple, universally accepted communication standards, have thrown things wide open. Now, companies can connect their supply chain with the supply chains of their suppliers and customers together in a single vast network that optimizes costs and opportunities for everyone involved. This was the reason for the B2B explosion; the idea that everyone a company does business with could be connected together into one big happy, cooperative family.

Of course, reality isn't quite that happy and cooperative. But today most companies share at least some data with their supply chain partners. The goal of these projects is greater supply chain visibility. The supply chain in most industries is like a big card game: the players don't want to show their cards because they don't trust anyone else with the information, but if they showed their hands they could all benefit. Suppliers wouldn't have to guess how many raw materials to order, and manufacturers wouldn't have to order more than they need from suppliers to make sure they have
enough on hand if demand for their products unexpectedly increases. And retailers would have fewer empty shelves if they shared the information they had about sales of a manufacturer's product in all their stores with the manufacturer. The Internet makes showing your hand to others possible, but centuries of distrust and lack of coordination within industries make it difficult.

During the last few years most companies have gotten over the trust issue. In many cases "gotten over" is a euphemism for "have been bullied into sharing supply chain information from a dominant industry player." Want to sell your goods in Wal-Mart? Better be prepared to share data and adhere to Wal-Mart's data-exchange standards.¹⁷

The payoff of timely and accurate supply chain information is the ability to make or ship only as much of a product as there is a market for. This is the practice known as just-in-time manufacturing, and it allows companies to reduce the amount of inventory that they keep. This can cut costs substantially, since you no longer need to pay to produce and store excess goods. But many companies and their supply chain partners have a long way to go before that level of supply chain flexibility can be achieved.

### 4.6.3 Supply chain collaboration:

Collaboration is said to be driving force behind effective supply chain management. Among many managers, information technology is viewed as the answer to achieve integration; however people are vital to supply chain success. It has become a new drum bit, profit margins can improve with collaboration and the smarter resource allocation that such an afford would bring about.¹⁸

Collaboration has been portrayed as the formation of inter-firm linkages or partnerships in which the parties involved work together and share information, resources and certain degrees of risk in order to accomplish mutual objectives.

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¹⁸ www.cpfr.org
Let's look at consumer-packaged goods for an example of collaboration. If there are two companies that have made supply chain a household word, they are Wal-Mart and Procter & Gamble. Before these two companies started collaborating back in the '80s, retailers shared very little information with manufacturers. But then the two giants built a software system that hooked P&G up to Wal-Mart's distribution centres. When P&G's products run low at the distribution centres, the system sends an automatic alert to P&G to ship more. In some cases, the system communicates down to the individual Wal-Mart store, allowing P&G monitor the shelves through real-time satellite link-ups that send messages to the factory whenever a P&G item swoops past a scanner at the register. Within the last couple of years, the relationship has expanded to include radio-frequency identification (RFID) technologies to gain even more insight into ridding inefficiencies in the supply chain.

With this kind of minute-to-minute information, P&G knows when to make, ship and display more products at the Wal-Mart stores. There's no need to keep products piled up in warehouses awaiting Wal-Mart's call. Invoicing and payments happen automatically too. The system saves P&G so much in time, reduced inventory and lower order-processing costs that it can afford to give Wal-Mart "low, everyday prices" without putting itself out of business.

4.6.4 The roadblocks to supply chain software:

Gaining trust from your suppliers and partners:

Supply chain automation is uniquely difficult because its complexity extends beyond a company's walls. Employees will need to change the way they work and so will the people from each supplier that a company adds to its network. Only the largest and most powerful manufacturers or retailers (i.e. Wal-Mart) can force such radical changes down suppliers' and partners' throats. Most companies have to sell outsiders on the system. Moreover, one company's goals in installing the system may be threatening to their suppliers, to say the least. For example, Wal-Mart's collaboration with P&G meant that P&G would assume more responsibility for inventory management, something retailers have traditionally done on their own. Wal-Mart had the clout to demand this from P&G, but it also gave P&G something in return—better information about Wal-Mart's product demand, which helped P&G
manufacture its products more efficiently. In order for a company to get its supply
chain partners to agree to collaborate, business leaders and supplier relations managers
have to be willing to compromise and help partners achieve their own goals.

Internal resistance to change:

If selling supply chain systems is difficult on the outside, it isn't much easier
inside. Operations people are accustomed to dealing with phone calls, faxes,
spreadsheets or hunches scrawled on paper, and will most likely want to keep it that
way. If management can't convince front-line operations people that using the
software will be worth their time, they will easily find ways to work around it. Senior
executives cannot disconnect the telephones and fax machines just because they have
supply chain software in place.

Many mistakes at first:

There is a diabolical twist to the quest for supply chain software acceptance
among employees. New supply chain systems process data as they are programmed to
do, but the technology cannot absorb a company's history and processes in the first
few months after an implementation. Forecasters and planners need to understand that
the first bits of information they get from a system might need some tweaking. If they
are not warned about the system's initial naiveté, they will think it is useless. In one
case, just before a large automotive industry supplier installed a new supply chain
forecasting application to predict demand for a product, an automaker put in an order
for an unusually large number of units. The system responded by predicting huge
demand for the product based largely on one unusual order. Blindly following the
system's numbers could have led to inaccurate orders for materials being sent to
suppliers within the chain. The company caught the problem but only after a demand
forecaster threw out the system's numbers and used his own. That created another
problem: Forecasters stopped trusting the system and worked strictly with their own
data. The supplier had to fine-tune the system itself then work on re-establishing
employees' confidence. Once employees understood that they would be merging their
expertise with the system's increasing accuracy, they began to accept and use the new
technology
4.7 Extended supply chain:

The extended supply chain is a clever way of describing everyone who contributes to a product. So if a company makes text books, then its extended supply chain would include the factories where the books are printed and bound, the company that sells the paper, the mill where that supplier buys their stock, and so on. It is important for a company to keep track of what is happening in its extended supply chain because a supplier or a supplier's supplier could end up having an impact on you (as the old saying goes, a chain is only as strong as its weakest link). For example, a fire in a paper mill might cause the text book manufacturer's paper supplier to run out of inventory. If the text book company knows what is happening in its extended supply chain it can find another paper vendor.

4.8 Impact of globalization on the supply chain:

Just in time manufacturing isn't the only way companies have used their supply chains to reduce cost. Manufacturing in developing countries is substantially cheaper than in the United States because of the low cost of labor. For example, the hourly wage for China's manufacturing and production workers is less than one dollar per hour. But foreign manufacturing brings with it another set of challenges. It isn't as easy to set up real-time data sharing with a factory in, say, China as it is with a factory you own in the United States. And the sheer distance that overseas goods need to travel—not to mention the number of vessels they need to travel on—to reach the U.S. increases the chance that they will get delayed. The bottom line is that foreign manufacturing brings back a lot of the uncertainty that supply chain systems were designed to eliminate. The good news is that technology capable of tracking shipments throughout the world is getting better. The bad news is that a lot of this technology is still pretty expensive, that some of the places a company would want to deploy it don't have the necessary infrastructure in place, and, well, there isn't a piece of technology out there that can make up for the whim of a Chinese customs official. Furthermore, labour costs in some places are so low that IT automation and monitoring projects may add more to costs—in terms of software, hardware and still-precious (and unreliable) bandwidth—than they save in productivity. Hence, some low-tech or commodity products may not be worth monitoring at all until they hit a ship in a foreign port.
In the meantime, the best bet for companies is to use whatever systems they can to gain as much visibility into the global supply chain as possible. It may be impossible to replicate the just in time model on a global scale, but by applying technology, and by choosing the supply chain partners who have the capability to share data with operations, a company can get many of the benefits of just in time while paying low foreign prices.

**Radio frequency identification (RFID) technology application in supply chain:**

RFID technology generates mountains of new data about the location of pallets, cases, cartons, totes and individual products in the supply chain. It produces oceans of information about when and where merchandise is manufactured, picked, packed and shipped. It creates rivers of numbers telling retailers about the expiration dates of their perishable items—numbers that will have to be stored, transmitted in real-time and shared with warehouse management, inventory management, financial and other enterprise systems. In other words, as RFID technologies in the supply chain spread into the operations of more manufacturers, parts suppliers and retailers, they will transform the supply chain as we know it today.

Another benefit of RFIDs is that, unlike barcodes, RFID tags can be read automatically by electronic readers. Imagine a truck carrying a container full of widgets entering a shipping terminal in China. If the container is equipped with an RFID tag, and the terminal has an RFID sensor network, that container's whereabouts can be automatically sent to Widget Co. without the truck ever slowing down. It has the potential to add a substantial amount of visibility into the extended supply chain.

Right now, the two biggest hurdles to widespread RFID adoption are the high cost of building the infrastructure to manage RFID data and a lack of return on investment (ROI) for many midsize and small manufacturers working in today's supply chains.
4.9 Supply Chain Strategies:

A Competitive Strategy defines the set of customers demand that it seeks to satisfy through its products and services. A supply chain strategy determines the nature of procurement of raw materials, transportation of materials to and from the company, manufacture of the products or operation to provide the service and distribution of the product to the customer along with any follow of service.

Supply chain strategies are the guideline and strategic initiatives towards implementation of SCM path determined for achieving profitability objectives in an organization. Some of strategies commonly followed by industries are as listed below:

1. Inventory reduction (JIT/ZI/VMI)
2. Outsourcing
3. Green Initiatives - Recycling of packaging material
4. Collaborative planning with key suppliers / Strategic Vendor Relationship
5. Reverse auction
6. Forward Buying (Long term Contract)
7. Innovations (Shrink wrap/Self-adhesive labels/Process automation etc.)
8. Total Logistics Cost Optimization
9. Decreasing manufacturing cost through waste reduction
10. Make & Buy Decision (Contract/Toll manufacturing)
11. People Motivation
12. Reducing response time across the supply chain / Cycle time reduction
13. Localisation (Tax optimization)

Outsourcing:

Meeting the increase demand of the customers, an organization can decide to focus on the core competency of his manufacturing processes like heat treatment, grinding process etc. and can plan to outsource non-core operation like the turning of components etc. Now a days information technology services, payroll system etc. are outsourced largely.

Postponement Strategy at Asian Paints – A case study:
Asian Paints\textsuperscript{19}, the market Leader in Paints, has a complex supply chain. The Decorative business Unit (DBU) manages 750 types of raw materials and packaging materials, from 500 vendors, 5 manufacturing plants, 13 processing centers, 7 regional distribution centers (RDC), 76 depots, serving 19,000 dealers across the country, to supply 1,500 SKUs of finished products.

Asian Paints have successfully employed the postponement strategy in its emulsion products category. The company offers four emulsion brands and in turns, each brand offers 150-250 shades. The company realized that offering a wide variety of color shades is essential in the emulsion market. An emulsion comprises of a “base” and a combination of “strainers”; the base provides the functional aspects while the strainers provide the required shades. At Asian paints, the mixing of the base and strainers, also known as “tinting”, is carried out at selected dealers’ shop in major cities across the country.

This concept is called “COLORWORLD” is operated wherein a computer is installed for choosing the shades and preparing the paints. A prospective customer can walk in to the dealer’s shop; choose the color shades for different rooms of the house. On knowing the size of rooms to be painted, the computer software could calculate the quantity of paints required.

When once the customer finalizes his order, the computer takes over mixing of the paints to match the colour shades selected and delivers to the containers for sale, on the spot. As far as dealer is concerned, he needs to maintain stock of the bases and strainers, which can be replenished from the nearest regional distribution centers.

It can be seen from the above that the final processing of the products is “postponement” to the last stage of the supply chain, which is certainly a win-win situation both for the company and their customers.

Greening Supply chain:

Green supply chain management is an approach to improve performance of process and products according to the requirements of the environmental regulations\(^20\). The rise in greenhouse emissions and pollution of the environments to realign their supply chain operations with a view of conserving the scarce resources. Green supply chain management is defined as “combined effect of green procurement, green manufacturing, green distribution and reverse logistics.” The idea of green supply chain management is to eliminate or minimize waste (energy, emissions and chemical/hazardous, solid wastes) along supply chain\(^21\) As for systematic and integrated strategy, Green supply chain management has emerged as an important new innovation that helps organizations develops “win win” strategies that achieves profit and market share objectives by lowering their environmental risks and impacts, while raising their ecological efficiency.

4.10 SCM Issues & Challenges:

Rapid innovation and globalization have generated tremendous opportunities and choices in the marketplace for consumers and companies alike. Competitive pressure has led to sourcing and manufacturing on global scale, resulting in a significant increase in product offerings. As business grow complex, so do the supply chains. In this era of intense competition, there are visible trends that can point to steady improvement in the supply chain metrics.

Some critical issues and challenges floats to supply chain are listed as follows.
1. Response to Market Fluctuation
2. Manpower Competency to deal with complexity
3. Ethical Practices & Professionalism
4. Response to Innovation - process automation
5. Employee Motivation to get the job done


In this chapter, we have seen various definitions of supply chain management. A supply chain is the set of value adding activities that connects an organization’s suppliers to the organization’s customers. Supply chain Management is the process of planning, organizing and controlling the flow of materials and services from suppliers to end users or customer. We have gone through the theories put forth from various perspectives. Clear objective of supply chain management is to maximize value of organization.

The supply chain concept developed through phases which are also seen as five management stages. The first stage is described as the era of internal logistics departmentalization. In the second stage, logistic began the migration from organizational decentralization to centralization of core functions driven by new attitudes associated with cost optimization and customer service. Stage three can be called as integrated logistics management. Stage four is supply chain management era with the strategic view of supply chain and after 2000s can be called as e-supply chain management era. In the new economy, e-commerce, e-markets are raised. An e-marketplace can be treated as physically and logically distributed system of interacting autonomous business entities. Yet there is a need for well-accepted interoperability standards, which must be meshed for supply chain integration to meet business demands.

Supply chain management is overviewed with its activities involved in an organization. These activities are strategic, tactical and operational in nature. It is also noted that supply chain evolved by encompassing its different functions namely planning, purchasing and procurement, stores and warehouse, logistics and so on.

As supply chain has taken strategic position, it become imperative to understand performance parameter of supply chain management. Information technology supported supply chain for its emergence as strategic function. The software tools and applications are great enablers in the progress. It has really turned through the dream of global enterprise into reality. Trade boundaries are being vanished and helped consumer movement. As functional spread is being expanded, the strategy to convert objective into action became dynamic leading to frequent review of challenges for business sustainability which we have seen in this chapter.