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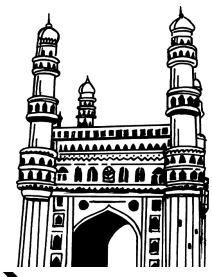

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LOGISTICS AND SUPPLY CHAIN MANAGEMENT

STUDY MANUAL

SOLVED MODEL PAPERS

SYLLABUS

UNIT - I

Understanding Supply Chain: Objectives of a Supply Chain, Importance, Stages of Supply Chain, Value Chain Process, Cycle View of Supply Chain Process, Key Issues in SCM, Logistics & SCM, Supply Chain Drivers and Obstacles, Supply Chain Strategies, Strategic Fit, Best Practices in SCM, Obstacles of Streamlined SCM, Green Supply Chain Management, Supply Chain Sustainability.

UNIT - II

Logistics: Evolution, Objectives, Components and Functions of Logistics Management, Difference between Logistics and Supply Chain, Distribution related Issues and Challenges. Gaining Competitive Advantage through Logistics Management, Transportation: Functions, Costs, and Mode of Transportation Network and Decision, Models, Containerization, Cross Docking, Reverse Logistics. Outsourcing: Nature and Concept, Strategic Decision to Outsourcing, Third-party Logistics (3PL), Fourth-party Logistics (4PL).

UNIT - III

Designing the Supply Chain Network: Designing the Distribution Network, Role of Distribution, Factors Influencing Distribution, Design Options, e-Business and its Impact, Distribution Networks in Practice, Network Design in the Supply Chain, Role of Network, Factors Affecting the Network Design Decisions, Modeling for Supply Chain.

UNIT - IV

Supply Chain Performance: Bullwhip Effect and Reduction, Performance Measurement: Dimension, Tools of Performance Measurement, SCOR Model. Demand Chain Management, Global Supply Chain, Challenges in Establishing Global Supply Chain, Factors that influence Designing Global Supply Chain Network.

UNIT - V

Coordination in a Supply Chain: Importance of Coordination, Lack of Supply Chain Coordination and the Bullwhip Effect, Obstacles to Coordination, Managerial Levels, Building Partnerships and Trust, Continuous Replenishment and Vendor Managed Inventories, Collaborative Planning, Forecasting and Replenishment. Role of Information Technology in Supply Chain, Supply Chain 4.0.

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UNIT I

Understanding Supply Chain: Objectives of a Supply Chain, Importance, Stages of Supply Chain, Value Chain Process, Cycle View of Supply Chain Process, Key Issues in SCM, Logistics & SCM, Supply Chain Drivers and Obstacles, Supply Chain Strategies, Strategic Fit, Best Practices in SCM, Obstacles of Streamlined SCM, Green Supply Chain Management, Supply Chain Sustainability.

1.1 UNDERSTANDING SUPPLY CHAIN

Q1. Explain briefly about Supply Chain.

(OR)

Discuss the conceptual model of Supply Chain.

Ans :

Meaning

- A supply chain is a system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer.
- A supply chain is a network of retailers, distributors, transporters, storage facilities, and suppliers that participate in the production, delivery and sale of a product to the consumer.
- These activities are associated with the flow and transformation of goods from the raw materials stage to the end user, as well as the associated information and funds flows.
- Supply chain activities transform natural resources, raw materials and components into a finished product that is delivered to the end customer.
- In simple terms, a supply chain is the link between a firm or business and its suppliers and customers.

Fig. : A conceptual model of a basic supply chain

- The supply chain, which is also referred to as the logistics network, consists of suppliers, manufacturing centres, warehouses, distribution centres, and retail outlets, as well as raw materials, work-in-process inventory, and finished products that flow between the facilities.

A supply chain has three key parts:

- **Supply :** which focuses on the raw materials supplied to manufacturing, including how, when, and from what location.
- **Manufacturing:** which focuses on converting these raw materials into finished products.
- **Distribution:** which focuses on ensuring that the products reach the consumers through an organized network of distributors, warehouses, and retailers.

Fig. : Key parts of supply chain

- A supply chain encompasses all activities in fulfilling customer demands and requests.
- In sophisticated supply chain systems, used products may re-enter the supply chain at any point where residual value is recyclable.
- A supply chain strategy refers to how the supply chain should operate in order to compete in the market. The strategy evaluates the benefits and costs relating to the operation. The supply chain strategy focuses on the actual operations of the organization and the supply chain that will be used to meet a specific goal.
- The supply chain integrates, coordinates and monitors the flow of materials, information, and funds.

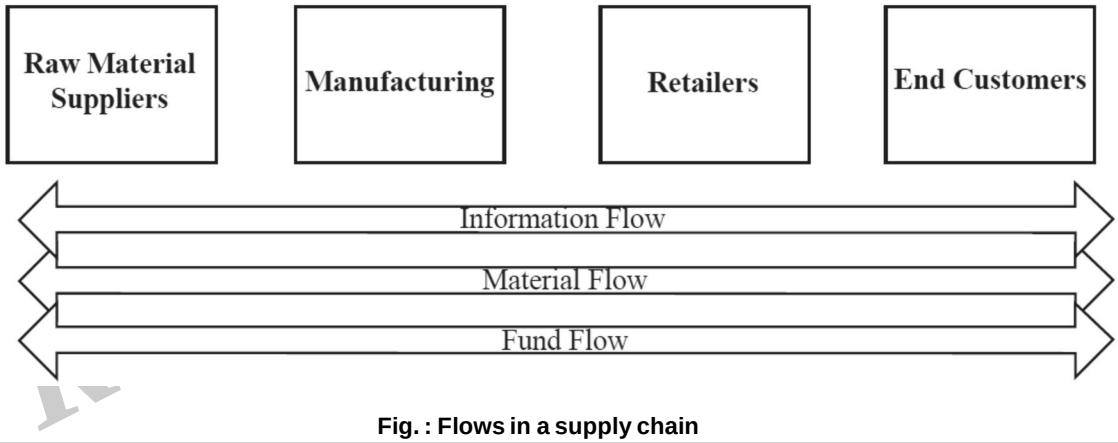


Fig. : Flows in a supply chain

1.1.1 Objectives of Supply Chain

Q2. Explain the objectives of supply chain.

Ans :

- The objective of every supply chain is to maximize the overall value generated.
- The value of a supply chain generates is the difference between what the final product is worth to the customer and the effort of the supply chain expands in filling the customer's request.
- For most commercial supply chains, the value will be strongly correlated with supply chain profitability, the difference between the revenue generated from the customer and the overall cost across the supply chain.
- For most commercial supply chains, the value will be strongly correlated with supply chain profitability, the difference between the revenue generated from the customer and the overall cost across the supply chain.

- **For example,** a customer purchasing a computer from Dell pays ` 2,000, which represents the revenue the supply china receives. Dell and other stages of the supply chain incur costs to convey information, produce components, store them, transport them, transfer funds, and so on.
- The difference between the ` 2,000 that the customer paid and the sum of all costs incurred by the supply chain to produce and distribute the computer represents the supply chain profitability. Supply chain profitability is the total profit to be shared across all supply chain. Supply chain success should be measured in terms of supply chain profitability and not in terms of the profits at an individual stage.
- Maximise the overall value of the product
- Maximise Supply Chain Profitability/supply chain surplus
- Flow of information and funds
- Effective Supply Chain Management - Management of supply chain assets, product, information and fund flow.

Q3. Define Supply Chain Management. Explain the functions of Supply Chain Management.

Ans :

Meaning

Supply chain management involves the integration of activities associated with the flow of information and raw materials from the production site till they reach the end-users (i.e., in the form of finished goods) by establishing effective supply chain relationships.

Due to globalization, SCM has become a necessity especially for the firms who are carrying out manufacturing activities to deliver products at low cost and at higher quality that their competitors do.

Definitions

The concept of supply chain management can be better understood with the following definitions,

1. **According to Stock & Lambert (2001)** "Supply chain integrates the key business processes of an organization from end-user through original suppliers that provide products, services and information that add value for customers and other stakeholders".
2. **According to - Mohanty & Deshmukh (2004)** "A supply chain is a network of facilities and distribution options that are engaged in the procurement of raw materials, transformation of these materials into intermediate and finished products and finally distributing them among the ultimate customers".
3. Today, success of any business firm not only depends on their ability to manage SCM operations in an efficient manner but also requires their close examination of all the activities of SCM starting from procurement of raw materials till the final production of finished goods.

Supply chain management is a cross-functional approach which involves the uptake of raw materials from external sources, internal processing of materials into finished goods and then finally, delivering them to the ultimate customers. In today's era, most of the organizations are focussing on their core-competencies by out sourcing raw materials distribution channels etc., with the help of third party who can perform those functions better than the focal firm both in terms of cost and efficiency.

Functions

Let us now study the major functions of SCM.

1. Integration

This is the major function of SCM. Integration involves interlinking of various elements or components of the supply chain with the objective of producing the desired results or products. For example, this can include the designing of a customer-friendly app to ensure effective communication between the enterprise and its customers.

2. Operations

The second important function of SCM is to ensure smooth operations of all components of the supply chain. Now this can vary from keeping an account of the number of raw materials purchased to the destination winch requires urgent delivery.

3. Purchasing

Another significant function of SCM deals with the purchase of raw materials or source items needed to manufacture the final product by the enterprise.

4. Distribution

Lastly, the final component of SCM deals with management of the distribution function which covers wholesalers, retailers, vendors and customers. On-time delivery of products is possible only through effective distribution function of the supply chain.

Therefore, it can be understood that when the enterprise manages its supply chain in an effective manner, it is bound to yield good results for the future.

It is to be noted that effective planning and implementation are indispensable for achieving the objectives of SCM.

1.1.2 Importance

Q4. Explain the significance of Supply Chain Management.

Ans : **(Imp.)**

The significant role of Supply Chain Management (SCM) is as follows,

1. Gaining Competitive Advantage

Due to rapid changes occurring in the competitive market situation, most of the businesses not only need to operate at low cost but must also develop their core competencies to distinguish themselves from their competitors. In order to achieve competitive advantage, the firms need to focus on those resources that act as core competencies for the firm while the tasks in which a firm is not proficient must be outsourced, so as to reduce both time and wastages associated with the process.

2. Adds Value to the Products

Today, SCM enable businesses not only to achieve "productivity advantage" but also to have "value advantage", in which reduced cost (cost minimization) can be achieved through productivity advantage while value advantage is used to make differential products which helps the firms to achieve 'differential plus' advantage over their competitor's offerings. Due to simultaneous actions for adding value and minimizing the cost of products, SCM plays an active role in producing innovative products by adopting improved processes which in turn reduces the time of product launch by shrinking the product life cycles.

3. Builds Relationship

As global SCM is an aggregate network of different parties belonging to different countries, SCM acts as a means for establishing effective relationships between these parties.

4. Helps in Integrating the Process

SCM is a process which involves all those activities required for the conversion of raw materials into finished goods till they reach the ultimate customer. In this process, the level of efficiency depends on the ability of different parties in effectively carrying out the different activities of SCM.

5. Helps in Achieving Economies of Scale

SCM enables the firm to achieve economies of scale by optimal utilization of resources (by different parties) and also by the adoption of different innovative technologies which helps in producing improved and quality products at a cost which the customers are willing to pay.

1.1.3 Stages of Supply Chain

Q5. Explain the various stages of Supply Chain.

Ans : **(Imp.)**

Stage 1: Plan

Planning involves a wide range of activities. Companies must first decide on their operations strategy. Whether to manufacture a product or component or buy it from a supplier is a major decision.

Companies must weigh the benefits and disadvantages of different options presented by international supply chains.

- Manufacturing a product component domestically
- Manufacturing a component in a foreign market by setting up international production facilities
- Buying a component from a foreign supplier
- Buying a component from a domestic supplier

If companies are manufacturing products, they must decide how they will be produced.

Goods can be:

- Make to stock (produced and stored, awaiting customer orders);
- Make to order (constructed in response to a customer order);
- Configure to order (partially manufactured the product and completed it after a firm customer order is received); or
- Engineer to order (manufactured a product to unique specifications provided by a customer).

Sometimes, goods can be produced by a combination of these methods. Companies must also decide whether they will outsource manufacturing. This operations planning is essential because these decisions influence the supply chain.

Planning also involves mapping out the network of manufacturing facilities and warehouses, determining the levels

of production and specifying transportation flows between sites. It also involves assessing how to improve the global supply chain and its management processes.

When planning, companies should ensure that their supply chain management strategies align to business strategies, that communication plans for the entire supply chain are decided and that methods of measuring performance and gathering data are established before planning begins.

Stage 2: Source

This aspect of supply chain management involves organizing the procurement of raw materials and components.

Procurement is the acquisition of goods and services at the best possible price, in the right quantity and at the right time.

When sources have been selected and vetted, companies must negotiate contracts and schedule deliveries. Supplier performance must be assessed and payments to the suppliers made when appropriate. In some cases, companies will be working with a network of suppliers. This will involve working with this network, managing inventory and company assets and ensuring that export and import requirements are met.

Stage 3: Make

This stage is concerned with scheduling of production activities, testing of products, packing and release. Companies must also manage rules for performance, data that must be stored, facilities and regulatory compliance.

Stage 4: Deliver

The delivery stage encompasses all the steps from processing customer inquiries to selecting distribution strategies and transportation options. Companies must also manage warehousing and inventory or pay fora service provider to manage these tasks for them.

The delivery stage includes any trial period or warranty period, customers or retail sites must be invoiced and payments received, and companies must manage import and export requirements for the finished product.

Stage 5: Return

Return is associated with managing all returns of defective products, including identifying the product condition, authorizing returns, scheduling product shipments, replacing defective products and providing refunds.

Returns also include "end-of-life" products (those that are in the end of their product lifetime and a vendor will no longer be marketing, selling, or promoting a particular product and may also be limiting or ending support for the product).

Companies must establish rules for the following:

- Product returns
- Monitoring performance and costs
- Managing inventory of returned product

Q6. Explain the conceptual framework of supply chain management.

Ans : **(Imp.)**

The conceptual framework of SCM is mainly used for designing and managing an effective supply chain process in an organization. This framework is a combination of three structural elements which are as follows,

The supply chain network structure The supply chain business process and The SCM components, as shown in the figure,

1. The supply chain network structure
2. The supply chain business process and
3. The SCM components, as shown in the figure,

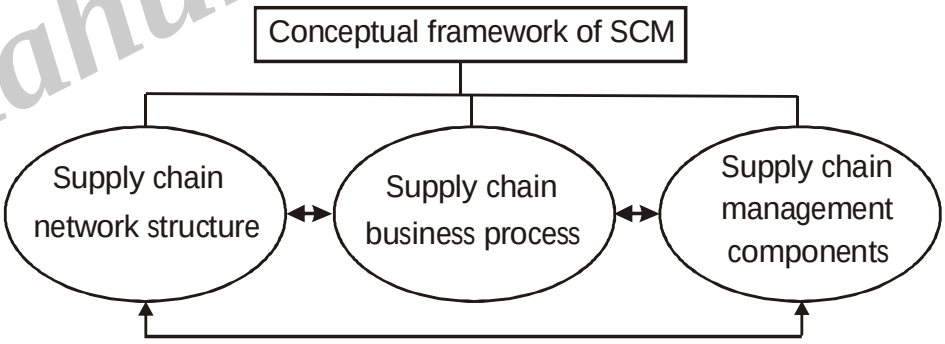


Fig.: Conceptual Framework of SCM

1. Supply Chain Network Structure

As the name indicates, it is a network of operating firms, consumers and all other parties responsible for the conversion of raw materials into finished goods.

Normally, firms have to maintain more than one supply chain because they have to deal with different parties of the chain during their operations. Hence, firms must focus on maintaining effective relationships with these parties depending on the level of their importance. Before designing a network structure, firms must be aware of the following three primary aspects of network structure.

(a) Supply chain members

(b) Structural dimensions of supply chain/ network

(c) Different process links.

2. Supply Chain Business Process

Traditionally, supply chain activities (upstream and downstream activities) were treated as separate entities but in recent times, all such activities have been combined to form an effective supply chain process.

In those days, marketing executives were responsible for identifying the demand for a product, based on this the purchase department places an order and satisfies its customers.

Integrated supply chain becomes functional only if it has all the relevant information required for its proper functioning. Customer centered system can be achieved by processing accurate information and in a timely manner. However, it is not easy to process the information accurately as, SCM has to face various issues related to the uncertainty of customer demand, manufacturing processes and performance of suppliers etc.

The members of Global Supply Chain Forum identified the following key supply chain processes,

(i) Customer relationship management

(ii) Customer service management

(iii) Demand management

(iv) Customer order fulfillment

(v) Manufacturing flow management

(vi) Procurement

(vii) Product development and commercialization

(viii) Returns.

3. Management Components of SCM

It is the third element of SCM framework. The level of integration among the business process links is highly dependent on the number of management components.

Nine management components are identified based on the interviews conducted with eighty' managers, which are as follows,

(i) Planing and control

(ii) Work structures

(iii) Structures product flows

(iv) Management methods

(v) The power and leadership structure

(vi) Reward and risk structures

(vii) Organization structures

(viii) Channels of information flows

(ix) Culture and attitude.

Hence, for the successful implementation of SCM frameworks all these components need to be integrated strong which results in the formation of an effective supply chain.

Q7. Explain various Elements of SCM.

Ans :

There are six basic elements to a supply chain: (i) production, (ii) supply, (iii) inventory, (iv) location, (v) transportation, and (vi) information. These have been discussed subsequently in this section.

(i) Production

Strategic decisions with regard to production focus on what customers want and what the market demands. This first stage in developing supply chain agility makes consideration on what and how many units of products to produce, and what, if any, parts or components should be produced at which plants or outsourced to capable suppliers. These strategic decisions related to production need to focus on capacity, quality and volume of goods, as well as take care of that customer demand and customer satisfaction are met. Alternatively, operational decisions concentrate on scheduling workloads, maintaining equipment, and meeting instant client or market demands. Quality control and workload balancing are concerns that need to be considered during decision-making.

(ii) Supply

In the next stage, a firm must determine what its facility/facilities are capable to produce, both economically and efficiently, while maintaining the good quality. But generally, the firms are not capable of giving excellent performance with the manufacture of all their components. Outsourcing is an outstanding option that can be considered for such products and components that cannot be produced effectively by a firm's facilities. Companies must carefully select suppliers for raw materials. When choosing a supplier, focus should be on developing velocity, quality and flexibility while at the same time reducing costs or maintaining low cost levels. In short, strategic decisions should be made to determine the core capabilities of a facility and outsourcing partnerships should grow from these decisions.

(iii) Inventory

Now, strategic decisions focus on inventory and how much product should be prepared in-house. A delicate balance exists between too much inventory, which can cost anywhere between 20 and 40 per cent of their value, and not enough inventory to meet market demands. This is a critical issue in effective supply chain management. Operational inventory decisions revolved around optimal levels of stock at each location to ensure customer satisfaction as the market demands fluctuate. Control policies must be looked at to determine correct levels of supplies at order and reorder points. These levels are critical to the day-to-day operation of companies and to maintain high customer satisfaction levels.

(iv) Location

For a firm, location decisions depend on market demands and determination of customer satisfaction. Strategic decisions must focus on the placement of production plants, distribution and stocking facilities, and placing them in prime locations to the market served. Once customer markets are determined, long-term commitment must be made to locate production and stocking facilities as close to the consumer as is practical. In industries where components are lightweight and market driven, facilities should be located close to the end-user. In heavier industries, careful consideration must be made to determine where plants should be located so as to be close to the raw material source. Decisions concerning location should also take into consideration tax and tariff issues, especially in inter-state and worldwide distribution.

(v) Transportation

In a firm, strategic transportation decisions are closely related to inventory decisions and meeting customer demands. For example, using air transport gets the product delivered quickly, and hence expediently, to the customer, but the costs incurred is high as opposed to shipping by boat or rail. Yet using sea or rail could mean having higher levels of inventory in-house to meet quick demands by the customers. Since around 30 per cent of the cost of a product is encompassed by transportation, using the correct transport mode is a critical strategic decision. Above all, customer service levels mustbe met, and this most of the times determines the mode of transport used. This may be an operational decision, but strategically, a firm must have transport modes in place to ensure a smooth distribution of its goods and services.

(vi) Information

An effective SCM requires gaining information from the point of end-use, and linking information resources throughout the value chain for speedy exchange. Overwhelming paper flow and incongruent computer systems are unacceptable in competitive world of today. Fostering innovation requires good organization of information. Linking computers through networks and the Internet, and streamlining the information flow, consolidates knowledge and facilitates velocity of products. Enterprise resource planning systems, account management software, product configurators, and global communications are major components of an effective SCM strategy.

1.2 VALUE CHAIN PROCESS

Q8. Explain the concept of Value Chain Process in supply chain management.

Ans : **(Imp.)**

- A value chain is a business model that describes the full range of activities needed to create a product or service.
- For companies that produce goods, a value chain comprises the steps that involve bringing a product from conception to distribution, and everything in between such as procuring raw materials, manufacturing functions, and marketing activities.
- A company conducts a value-chain analysis by evaluating the detailed procedures involved in each step of its business.
- The purpose of value-chain analyses is to increase production efficiency so that a company may deliver maximum value forthe least possible cost.

Components of a Value Chain

In his concept of a value chain, Porter splits a business's activities into two categories, "primary" and "support," whose sample activities we list below. Specific activities in each category will vary according to the industry.

(I) Primary activities

Primary activities consist of five components, and all are essential for adding value and creating a competitive advantage:

(i) Inbound logistics

Functions like receiving, warehousing, and managing inventory.

(ii) Operations

Procedures for converting raw materials into finished product.

(iii) Outbound logistics

Activities to distribute a final product to a consumer.

(iv) Marketing and sales

Strategies to enhance visibility and target appropriate customers such as advertising, promotion, and pricing.

(v) Service

Programs to maintain products and enhance consumer experience customer service, maintenance, repair, refund, and exchange.

(II) Support Activities

The role of support activities is to help make the primary activities more efficient. When you increase the efficiency of any of the four support activities, it benefits at least one of the five primary activities. These support activities are generally denoted as overhead costs on a company's income statement:

(i) Procurement

How a company obtains raw materials.

(ii) Technological development

Used at a firm's research and development (R&D) stage designing and developing manufacturing techniques; and automating processes.

(iii) Human resources (HR) management

Hiring and retaining employees who will fulfill business strategy; and help design, market, and sell the product.

(iv) Infrastructure

Company systems; and composition of its management team planning, accounting, finance, and quality control.

Process

Step 1 - Identify subactivities for each primary activity

For each primary activity, determine which specific subactivities create value. There are three different types of subactivities:-

(i) Direct activities

Create value by themselves. For example, in a book publisher's marketing and sales activity, direct subactivities include making sales calls to bookstores, advertising, and selling online.

(ii) Indirect activities

Allow direct activities to run smoothly. Forthe book publisher's sales and marketing activity, indirect subactivities include managing the sales force and keeping customer records.

(iii) Quality assurance

Activities ensure that direct and indirect activities meet the necessary standards. For the book publisher's sales and marketing activity, this might include proofreading and editing advertisements.

Step 2 - Identify subactivities for each support activity.

For each of the Human Resource Management, Technology Development and Procurement support activities, determine the subactivities that create value within each primary activity. For example, consider how human resource management adds value to inbound logistics, operations, outbound logistics, and so on. As in Step 1, look for direct, indirect, and quality assurance subactivities.

Then identify the various value-creating subactivities in your company's infrastructure. These will generally be cross-functional in nature, rather than specific to each primary activity. Again, look for direct, indirect, and quality assurance activities.

Step 3-Identify links

Find the connections between all of the value activities you've identified. This will take time, but the links are key to increasing competitive advantage from the value chain framework. For example, there's a link between developing the sales force (an HR investment) and sales volumes. There's another link between order turnaround times, and service phone calls from frustrated customers waiting for deliveries.

Step 4 - Look for opportunities to increase value

Review each of the subactivities and links that you've identified, and think about how you can change or enhance it to maximize the value you offer to customers (customers of support activities can be internal as well as external).

1.3 Cycle View of Supply Chain Process

Q9. Describe concept of Cycle View of Supply Chain Process.

Ans : **(Imp.)**

A supply chain is a process and a flow that works in order between and within the different phases of supply chain so that a company ca fulfill the demands of a customer. There are various processes and flows within and between stages of a product supply chain, all designed to meet a customer's need for a product.

I) Cycle View

II) Push and Pull View

The cycle view of supply chain defines clearly which processes are involved and who owns which processes. When making operational decisions, this view is very useful because it specifies the roles and responsibilities of each member of the supply chain as well as the intended outcomes for each process.

There are a series of processes involved in the supply chain, each of which occurs at the interface between two successive supply chain stages. A supply chain consists of a series of cycles that overlap between successive stages.

I) Cycle View of Supply Chain Management

Each cycle involves the customer stage placing an order and receiving it from the supplier stage once it has been supplied by it. In each cycle, two successive stages occur at the same time

(i) Cycle of Customer Orders

(ii) Replenishment Cycle

(iii) Manufacturing Cycle

(iv) Procurement Cycle

Cycle view clearly defines processes involved and the owners of each process. This cycle view specifies the roles and responsibilities of each member and the desired outcome of each process.

(i) Cycle of Customer Orders

Customer arrival means the arrival of a customer to the market to make a purchase of his or her choice. Success of the business is stated when the business starts getting interaction from the customers. Customer arrival is one main factor for the marketplace. The customers will be doing the purchases or places the orders.

(ii) Replenishment Cycle

In the replenishment cycle stage, mostly, there are many retailers exactly reacted as a customer; the stage is customer order entry according to main features. Distributor and retailer both are involved in replenishment cycle in integrated form.

(iii) Manufacturing Cycle

In this process, the main parties that are involved are distributors with the manufacturer and/or retailers with manufacturers. In addition, includes replenishing distributor's inventory.

(iv) Procurement Cycle

The interface of manufacturer/supplier is necessary for the stage to occur. It included all processes in which it is being insured the mobilization of materials from the availability of manufacturing until the scheduling perspective.

II) Push/Pull View of SCM

A push/pull view of the supply chain categories processes based on whether they are initiated in response to a customer order (pull) or in anticipation of a customer order (push). This view is very useful when considering strategic decisions relating to supply chain design.

The processes in a supply chain are divided into two categories depending on whether they are executed in response to a customer order (pull) or in anticipation of a customer order (push). Supply chain processes fall into one of two categories depending on the timing of their execution relative to customer demand.

This isomer global view of how supply chain processes relate to customer orders. The relative proportion of push and pull processes can have an impact on supply chain performance. Push/pull boundary separates push processes from pull processes.

- **Pull:** execution is initiated in response to a customer order (reactive)
- **Push:** execution is initiated in anticipation of customer orders (speculative).

1.4 KEY ISSUES IN SCM

Q10. Discuss various issues of supply chain management.

Ans : **(Imp.)**

The issues in Supply Chain Management (SCM) can lied under tree levels which are as follows,

(i) Strategic Level

This level emphasizes on the decisions which have an enduring impact on the firm the various decisions which are taken at this level are, decisions about the number, capacity of warehouses and their location, manufacturing plants and the flow of material through the logistics network.

(ii) Tactical Level

This level deals with the decisions which are updated after every quarter and after every year.

The decisions which are taken at this level are purchasing and production decisions, transportation strategies, inventory policies, frequency of customer visit etc.

(iii) Operational Level

This level deals with the day-to-day decisions like scheduling, lead time quotations, truck loading and routing.

The significant issues, trade-offs and questions related to various decisions are as follows:

1. Distribution Network Configuration

The organizations should establish its distribution network efficiently, by selecting a set of warehouse locations, and capacities, ascertaining the production level for each product at each plant and establishing transportation facilities either from the plant to warehouse or from warehouse to retailer.

These activities helps in minimizing the over all production, transportation, inventory and transportation costs and fulfills the service needs. Effective distribution network configuration is a complex optimization problem which needs advanced technology and approaches for obtaining solutions.

2. Supply Contacts

The supply contracts (which mentions the pricing and volume discounts, quality, delivery lead times, returns etc.) helps in the replacement of the traditional supply chain strategy with the strategy which optimizes the performance of complete supply chain.

The various pricing strategies such as volume discount and revenue sharing contracts which are adopted by the suppliers for encouraging the buyers to place more orders helps in increasing their profile.

3. Product Design

Supply chain in significantly influenced by the product design. Some product designs may enhance inventory holding or transportation costs while others may help in reducing the manufacturing lead time.

But the cost of designing is very high. So, it should be designed at an appropriate time so as to decrease the cost of logistics or supply chain lead times. The changes to be made in supply chain should be ascertained for exploiting the new product design.

4. Inventory Control

Generally a retailer maintains a specific inventory level so as to meet the changing demands of customers. The retailer anticipates the demand based on the past data. The basic aim of the retailer is to ascertain when to reorder for a new batch of the product and how much to order, so as to minimize the inventory ordering and holding costs.

The retailer holds a specific amount of inventory for various reasons like uncertainty in the customer demand, uncertainty in the supply process, etc.

The retailer has to decide about the quantity to be ordered, (i.e.; more Vian, less than, or exactly same as the anticipated demand) and also the inventory turn over ratio.

5. Outsourcing and Procurement Strategies

The firms while formulating its supply chain strategy needs to consider the following aspects:

(i) Integration of various activities in the supply chain.

(ii) The products which needs to be manufactured internally.

(iii) The products which needs to be bought from outside sources.

The firms should recognize the manufacturing activities which are lying in its set of core competencies and must complete its internal activities.

The firm should also decide about the products and services which needs to be outsourced, when to outsource and the risks associated with it.

The affect of internet on procurement strategies should also decide how to deal with the trading partners i.e.; whether through the public exchange or private exchange.

6. Customer Value

The customer value has succeeded over the measures like quality and customer satisfaction, as it measures the contribution made by a company to its customer on the basis of the whole range of products, services, intangibles, etc.

The supply chain management of a firm would be effective if it satisfies the customer needs and offer them the value and provides answers to various questions like;

(a) How to ascertain the customer value in various industries and how it is measured

(b) How the information technology improves the customer value in supply cain and how does it (supply chain) contributes towards the customer value.

7. Supply Chain Integration and Strategic Partnering

The need for the companies to integrate their supply chains and involve in strategic partnering arise from their customers as well as from their supply chain partners. This integration can be attained effectively when the information is shared and the operations are planned. However, the companies should be clear about the type of information to be shared and used, the influence of information on the design and operation of supply cain, etc.

8. Information Technology and Decision-Support System

Information technology acts as a key enabler of effective supply chain management due to the availability of the vast data and the saving attained by the comprehensive evaluation of these data. The various issues related to information technology in SCM are;

(a) Transferring and ignoring the data which is important for SCM.

(b) Role of e-commerce.

(c) Infrastructure needed internally and also between the supply chain partners.

(d) Reasons for considering the information technology and decision support systems as the significant tools in a gaining competitive advantage in the market.

Q11. Explain briefly about the various challenges faced by the firm in efficient management of supply chain.

Ans :

While developing and sustaining an efficient supply chain, the firms have to tackle various challenges/issues. Some of them are,

1. Supply Chain Networks

Due to the rapid changes occurring in the marketing environment, the firms need to have a capable and flexible network system which can be suitable under any circumstance both in short as well as in long run. However, in real-based situation, implementation of such networks is a very difficult task.

2. Complexity

In today's competitive era, every firm is expanding its scale of operations by penetrating the global/overseas market. But these globalized operations make the network of supply chain more complex by including a wide range of individuals. Furthermore, customer/supplier locations, transportation requirements, trade regulations, taxes, Stock Keeping Units (SKUs) increase'complexity in SCM. The rapid expansion of SKUs can be hindered by rationalizing them based on their extent of contributions to the overall profitability such that slow movers or unnecessary intermediate items which do not have impact on profitability can be eliminated. In the same manner, locations and suppliers/vendors need to be rationalized to reduce high operating costs. Even though development of complexity in supply chain is a usual phenomena but what organizations need to do is to evaluate these complexities on a regular basis, so that they can be reduced to a large extent.

3. Inventory Deployment

In supply chains, duplication of inventory along the supply chain leads to 'Bull whip effect', which can be reduced by maintaining effective coordination or integration between supply chain activities. Hence, inventory needs to be effectively deployed as it helps in reducing cost and increasing efficiency of operations.

4. Information

Firms are using technology and communication systems for the collection of information. However, this collected data is useless, unless it is effectively used in making decisions regarding inventory, customer service, locations, transportations etc. In this aspect, the major challenge faced by the firms is to accurately share the collected data among all the parties of supply chain and to integrate such data in an efficient manner, so as to make them available to all the parties of supply chain.

5. Cost/Value

It is one of the major problems faced by the firm in global SCM, where firms are competing with each other by producing quality or value-added products at low cost than their competitor's offerings.

6. Organizational Relationships

As SCM is an integrated network of activities performed by producers, suppliers, customers, transportation agents, distributors, retailers etc. Collaboration is very much important for its operations. Both internal and external cooperation is facilitated by effective process of communication across the supply chain.

7. Performance Measurement

Most of the organizations set performance targets or metrics which helps them in analyzing their progress over different time frames. Sometimes, these measures act as performance objectives which firms need to achieve. The biggest challenge in this aspect is that firms need to recognize the lower level metrics that help them to achieve increased performance levels in the supply chains.

8. Technology

In today's competitive era, every organization wants to become an industry leader which forces them to spend huge amount on technology which helps in producing desirable product at low cost. Now, the challenge for any firm is to appropriately select, evaluate and successfully implement that particular technology which brings desirable improvements to the firm.

9. Transportation Management

The main objective of a firm's supply chain is to deliver the right product, at the right time, in the right quantity and quality, at the right cost and to the right destination. In order to realize this objective, transportation plays an important role.

10. Supply Chain Security

Traditionally, safe and on-time delivery of products to customers was the main function of supply chain, but it acts as a major issue in the present scenario due to increased risk of interruptions or shutdowns of supply chains. Even terrorist attack is an unexpected threat for any organization which establishes the need of scenario analysis, through which possible threats and environmental situations can be identified. Based on the results of scenario analysis, a firm plans for suitable alternatives.

1.5 LOGISTICS & SCM

Q12. Define Logistics. Explain different types of Logistics.

Ans :

Meaning

- Logistics is generally the detailed organization and implementation of a complex operation. In a general business sense, logistics manages the flow of goods between the point of origin and the point of consumption to meet the requirements of customers or corporations.
- The resources managed in logistics may include tangible goods such as materials, equipment, and supplies, as well as food and other consumable items.
- In military science, logistics is concerned with maintaining army supply lines while disrupting those of the enemy, since an armed force without resources and transportation is defenseless. Military logistics was already practiced in the ancient world and as the modern military has a significant need for logistics solutions, advanced implementations

have been developed. In military logistics, logistics officers manage how and when to move resources to the places they are needed.

- Logistics management is the part of supply chain management and supply chain engineering that plans, implements, and controls the efficient, effective forward, and reverse flow and storage of goods, services, and related information between the point of origin and point of consumption to meet customers' requirements.
- The complexity of logistics can be modeled, analyzed, visualized, and optimized by dedicated simulation software. The minimization of the use of resources is a common motivation in all logistics fields. A professional working in the field of logistics management is called a logistician.

Types :

(i) Procurement logistics

Procurement logistics consists of activities such as market research, requirements planning, make-or-buy decisions, supplier management, ordering, and order controlling. The targets in procurement logistics might be contradictory: maximizing efficiency by concentrating on core competences, outsourcing while maintaining the autonomy of the company, or minimizing procurement costs while maximizing security within the supply process.

(ii) Advance Logistics

Advance Logistics consists of the activities required to set up or establish a plan for logistics activities to occur.

(iii) Global Logistics

Global Logistics is technically the process of managing the "flow" of goods through what is called a supply chain, from its place of production to other parts of the world. This often requires an intermodal transport system, transport via ocean, air, rail, and truck. The effectiveness of global logistics is measured in the Logistics Performance Index.

(iv) Distribution logistics

Distribution logistics has, as main tasks, the delivery of the finished products to the customer. It consists of order processing, warehousing, and transportation. Distribution logistics is necessary because the time, place, and quantity of production differ with the time, place, and quantity of consumption.

(v) Disposal logistics

Disposal logistics has as its main function to reduce logistics cost(s) and enhance services related to the disposal of waste produced during the operation of a business.

(vi) Reverse logistics

Reverse logistics denotes all those operations related to the reuse of products and materials. The reverse logistics process includes the management and the sale of surpluses, as well as products being returned to vendors from buyers. Reverse logistics stands for all operations related to the reuse of products and materials. It is "the process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal. More precisely, reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. The opposite of reverse logistics is forward logistics."

(vii) Green Logistics

Green Logistics describes all attempts to measure and minimize the ecological impact of logistics activities.

This includes all activities of the forward and reverse flows. This can be achieved through intermodal freight transport, path optimization, vehicle saturation and city logistics.

1.6 Supply Chain Drivers and Obstacles

Q13. Explain briefly about Supply Chain Drivers and Obstacles?

Ans : **(Imp.)**

Drivers

SCM is involved with integrating three key flows, i.e., of products/materials, information and funds, between the different stages, across the boundaries of the companies:

(i) Product/Materials

This is the most obvious and visible part of the supply chain. Physically, the flow manifests itself in the form of goods and services. This is also called the 'value flow'. Goods and service flows follow a similar sequence. For example, goods flows constitute raw material (including material being transported), work in process, finished goods, and spares, and reverse flows due to returns, rework or recycling of the goods. The vendor side of these flows is called 'upstream' and the flows towards the customer are referred as 'downstream'.

(ii) Flow of information

The partners in a supply chain are able to coordinate plans in the long run if there is a proper flow of information. Appropriate flow of information also allows the partners to control, monitor and keep a check on the daily flow of materials/goods to the chain. It consists of flows both from vendor to the customer and from the customer to the vendor. The downstream flow of information has important components like capacity estimates for plans, stocks available, dispatch advices, stock transfer notes, quality assurance reports, warranties, etc. The upstream components of information flow are inputs for forecasts, marketing plans, dispatch plans, production plans and procurement quantities and timing, orders from customers and dealers, quality feedback, and warranties.

(iii) Flow of funds

This is the commercial pan of the supply chain, and runs counter to the direction of the value flow. It reflects the money paid with respect to the transfer of title and / or service delivery in the supply chain. Other features to cash flow are credit periods / advances for payments from customers / dealers, and to vendors. The cash flow determines how the various actors in the supply chain finance the value flow.

Obstacles

The utilization of the concept of supply chain management will increase, as the markets for its adoption grows simultaneously. With the rise in the number of organizations on the global platform, many organizations are entering into collaborations with foreign companies in creating foreign markets and production houses.

(i) Increasing Supply Chain Responsiveness

There have been several concepts that have grown with the purpose of making the organization more adaptable and receptive to customer preferences and demands.

(ii) Reducing Supply Chain Costs

As supply chains compete with each other, one of the vital objectives of supply chain management is cost reduction. There are a number of ways in which cost reduction can be achieved throughout the supply chain. These include:

- Decreasing wastes
- Decreasing the cost of acquiring products
- Decreasing surplus inventories
- Reducing excess inventories
- Reducing non-worthy activities among the supply chain members

With the further development of supply chains, they are most likely to enhance their performance by reducing the expenditure involved in supply chain management. This can be achieved through the use of long lasting enhancement efforts, efficient supply chain communication, and a further combination of several methods and techniques.

1.7 Supply Chain Strategies

Q14. What is Supply Chain Strategy?

Ans :

- Supply chain strategy is a broader term which mainly focuses on the methods of operations of supply chain in order to achieve competitive edge over competitors.
- Supply chain strategy is a continuous process, in which operational components are continuously analyzed to assess their cost-benefit trade-offs.
- Supply chain strategy is mainly responsible for creating value for both the company as well as for its stakeholders.
- An effective supply chain strategy along with innovative technologies not only help in meeting the demands of the market but also help the firm to reach the highest level of customer satisfaction.

1.7.1 Strategic Fit

Q15. Explain the process of achieving Strategic Fit.

Ans : **(Imp.)**

- The success of an organization is dependent on whether its supply chain and competitive strategies complement each other. This is termed as the organizational strategic fit.
- An organization should ensure that the goals that it seeks to attain through its supply chain and the customer needs that it seeks to satisfy through its competitive strategy are consistent.
- Strategic fit is an important determinant of a supply chain strategy or design phase.
- The value chain of a company can work efficiently if all the functional strategies of the company are efficient. It is incorrect to say that these functions are independent of each other and the success of one function can ensure the success of the entire chain.
- Actually, dysfunction of even one function may easily lead to the failure of the entire chain. A company's success or failure is determined by the following factors:
  1. The overall supply chain strategy must be coordinated by coinciding the competitive strategy and all the other functional strategies of a firm. Each functional strategy must sustain corresponding functional strategies to ensure the achievement of a firm's competitive strategy goal.
  2. For the successful execution of these strategies, all organizational processes and resources should conform to the functional strategies in their performance.
- The failure of a company may be the result of the absence of a strategic fit or the inefficiency of the company to cater to the demands of its strategic fit.
- It is important for a company to align all its significant functional strategies with the overall competitive strategy in order to influence the strategic fit. It is possible for conflicts to arise between different goals if a company is unable to achieve this alignment.

  These conflicts mainly arise because different functional strategies of a firm target different customer needs. The functional goals are supported by organizational processes and resources, and so. if there is any conflict in its functional goals, a company can expect that the conflict will escalate during the process of execution.

Process of Achieving Strategic Fit

- The focus of a company's competitive strategy is the customers whose needs it is expected to meet.
- The strategic fit can only be achieved when the supply chain of a company operates efficiently and ensures that the company satisfies its customers' needs completely.
- Following are the three main steps that are involved in achieving a strategic fit for the company.

1. Recognizing the customer and supply chain uncertainty

- Firstly, the company must recognize the needs of the customers that it wishes to satisfy and identify the uncertainty that all supply chains are characterized by. By doing so, a company is able to ascertain the desired cost and service requirements.
- The element of uncertainty inherent in a supply chain helps a company to assess the extent of possible disruption and delay in advance, so that the company is already prepared to face the challenges arising out of any disruption in the supply chain. But how does a company understand what its customers expect from it? Let us compare the customer behaviour towards a local grocery store and a hypermarket such as the Big Bazaar.
- When customers visit the local grocery store to buy grocery, they go there mainly for the sake of convenience of location, and not because they are looking for low prices. Contrastingly price is a major factor for customers going to a Big Bazaar outlet, despite the store maintaining relatively less variety in their products and selling large package sizes. Even though the customers visit both stores to buy their groceries, they still demand changes in accordance with certain attributes, hi the case of a local grocery store, the customers take the convenience factor into account, while at a store like Big Bazaar the low prices are what attracts them the most. However, the customer demand is neither predictable nor one-dimensional. It is liable to change along the following parameters:
- **Quantity of the goods to be purchased**

  A manufacturer (consumer) wishing to develop a new product line would require raw materials in bulk rather than a manufacturer (consumer) who is buying to meet an emergency production requirement.
- **Tolerable response time allowed by the customers**

  An emergency order implies a shorter tolerable response time while a customer who has ordered materials to meet his/her construction order would be willing to tolerate a longer order delivery period.
- **Variety of goods required**

  If a customer requires goods for emergency repairs, lie/she will insist on sourcing the products available as quickly as possible from a single supplier, whereas a customer requiring goods for a new construction order would prefer sourcing from more than one supplier.
- **Service level required**

  A customer will place high premium on the level of customer service for emergency orders. For an emergency order, they would prefer a supplier who can cater to their entire product and service demands. If the service levels required are not up to the mark, the customer would discontinue the services of a supplier. This is not likely to happen else where there are long lead times in orders. For example, for booking a new Swift diesel car. There is a waiting period of three to six months. This is a long lead time and only customers who can wait for this amount of time would be willing to buy the car.
- **Price of the product**

  Emergency orders are less sensitive to price whereas bulk and time-consuming orders are negotiated.
- **Desired rate of innovation in the product**

  When customers visit high-end stores, they expect to be surprised by new designs and innovations frequently, in comparison to wholesale or discounted stores. The needs of a particular customer segment will show signs of similarity while the customers belonging to different segments have varying needs. The identification of the key measure for combining these attributes helps in defining the areas that the supply chain should escalate.
- **Implied demand uncertainty**

  Seemingly, one may view each of the customer need categories as different from the other. However, it is possible to translate customers 'demands into a standard of

'measurement of implied demand uncertainty. The reason for the existence of this uncertainty is the percentage of demand that the supply chain needs to satisfy

2. Realizing the supply chain capabilities

- All supply chains are devised with a view to execute important functional roles of the supply chain in an effective and coordinated manner. An organization must take a note of the core strengths of its supply chain.
- The most important features of a supply chain and its classification can be shredded by placing a supply chain on a spectrum. It must be noted that there are many characteristics of a customer needs supply chain. So, we need to consider a characteristic that is common to all supply chains, namely, die trade-off between responsiveness and efficiency.
- Supply chain responsiveness may be defined as the ability of the supply chain to do the following:
- Responding to a wide range of quantities demanded
- Handling large varieties of products
- Building highly innovative products
- Meeting short lead times and high service levels
- Handling supply uncertainty

These attributes maybe found to be common to the various characteristics of demand and supply that result in high implied uncertainty. The better a supply chain invests in these abilities, the better is its responsiveness. However, for a firm to achieve high levels of responsiveness, it must incur high costs to increase its capacity.

3. Evolving to achieve strategic fit

- If the core functional strategies of a supply chain are not in tandem with the needs of the customers, the organization must either reorganize the components of its supply chain to meet the demands of its competitive strategy or must change its strategy to ultimately achieve the strategic fit. So. consistency should be maintained between the film's degree of supply chain responsiveness and its implied uncertainty.
- A direct relationship exists between responsiveness and implied uncertainty. The increased levels of implied uncertainty can be best met by an increase in the supply chain responsiveness.
- The strategic fit of a company expresses this very relationship between responsiveness and implied uncertainty. In order to improve its performance, a firm should move its competitive strategy (resulting in implied uncertainty) and supply chain strategy (resulting in responsiveness) towards the sphere of strategic fit.
- With regard to achieving a complete strategic fit. a firm should ensure that its functional strategies agree with its competitive strategy. It is required that the functional strategies reinforce and warrant the goals of the competitive strategy, and all sub-strategies within the supply chain like manufacturing, inventory and purchasing are also consistent with the supply chain's level of responsiveness.
- Different organizations lie differently along the responsiveness spectrum, and so, their functional strategies are formed in a way that corresponds to their level of responsiveness.
- A supply chain characterized by high levels of responsiveness should be more focused towards making its functional strategies responsive, while supply chains characterized by efficiency should try to make their functional strategies more efficient. Thus, the last step in the achievement of a strategic fit is to align supply chain responsiveness with the implied uncertainty from demand and supply. The drive for achieving the strategic fit should come from the highest levels of the organization.
- In many organizations, the competitive and functional strategies are devised by different groups. But there should be proper communication and coordination between the groups and the higher management including the CEO/COO to achieve the strategic fit. Many films fail because they are unable to achieve a strategic fit.

Q16. Explain the factors affecting strategic fit.

Ans :

It is very easy to have an effective strategic fit in place when a bank targets a single customer segment. However, the strategic fit of a company is affected differently when it has multiple products to offer, multiple customer segments to serve and when its products undergo their life cycles. The following are the factors that affect the strategic fit of a firm:

(i) Multiple products and customer segments

- Most firms deal in multiple products to cater to different customer segments each having different characteristics.
- For example, a store may choose to deal in seasonal products like woollens that may have high implied demand uncertainty along with socks that have low implied demand uncertainty. If one tries to map this dynamic on an uncertainty spectrum, each will fall differently on the spectrum. When a firm devices supply chain strategy in such cases, its main consideration is to balance efficiency and responsiveness through its supply chain because it has a variety of products to offer to its vast customer segments.

(ii) Product life cycle

- All products have a life cycle and as they go through this, there are changes in the characteristics of demand, and the customer needs are also evolving constantly.
- The supply characteristics also change as the product and production technologies mature and evolve. High technology products go through such life cycle swings quite often over a very compressed span of time.
- A product goes through different stages from its introduction in the market, when only a particular customer segment shows interest in the product and when the supply is uncertain, to the point at which the product establishes itself as a commodity with the market being saturated and the supply becoming predictable.
- So in order to maintain its strategic fit. The company's supply chain strategy' must evolve in tandem with its products entering different phases.

(iii) Competitive changes over time

- When matching supply chain and competitive strategies, it's important to consider changes in the competitor behaviour. Going by their own product's life cycle, the competitors can also change the market landscape and this requires a change in the company's competitive strategy.
- The growing competition has flooded the market with a wide variety of goods, but this has made the customers more restless interms of need satisfaction. Thus, the companies are competing with each other to manufacture a variety of products at reasonable prices.
- As more firms increase the level of variety offered, supply chains have been modelled to develop the ability to supply goods of wide variety.
- A firm must change its competitive strategies responding to any changes in the competitive landscape, further changing its supply chain strategy with a view to maintaining the strategic fit.

(iv) Expansion of Strategic Scope

- The functions and stages that devise an integrated strategy with a shared objective are referred to as the scope of strategic fit.
- The performance of each task within a functional area requires devising its own independent strategy with the purpose of optimizing the individual performance of each task.
- In this case, the strategic fit has a limited scope where a single operation within a functional area within a stage of the supply chain is focused upon.
- On the other hand, strategy is also devised for all functional areas within all stages of die supply chain sharing the common purpose of the maximization of supply chain profit. In this case, the scope of strategic fit extends to the entire supply chain.

- The performance of a supply chain can be improved with die expansion of the scope of strategic fit. The scope of strategic fit can be represented on a two-dimensional grid. The horizontal line represents the scope of strategic fit achieved across all the stages of a supply chain, starting from suppliers and moving all the way along the chain to the customer. The vertical line represents the scope of the strategic fit as considered across different functional strategies, competition, product development, supply chain and marketing.

Q17. Discuss briefly about the various components of supply chain strategy.

Ans :

The following are the key components of supply chain strategy,

1. Sourcing Strategy

Most of the organizations are preferring the phenomena of outsourcing over in-house manufacturing. Out sourcing is a process wherein the focal firm depends on suppliers/vendors for raw materials, quality control mechanisms, production and other functional activities which play an important role in reducing the overall cost of production. Firms may go for either complete or partial sourcing depending on their capabilities. Evans and Danks have classified the sourcing strategy into three elements as follows,

(i) Manufacturing management

(ii) Make or buy decisions

(iii) Capacity management.

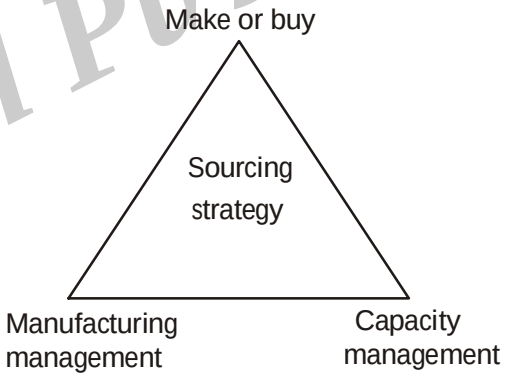


Fig.: Sourcing Strategy

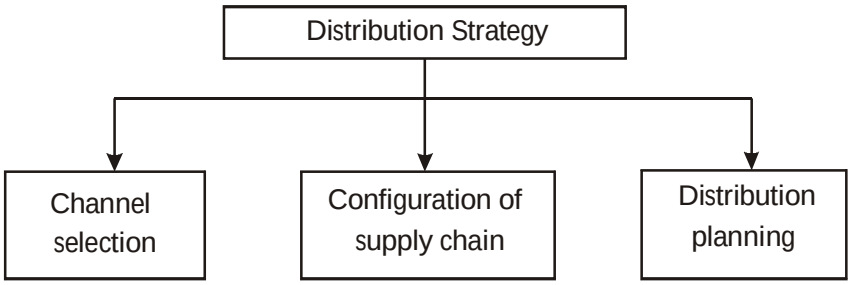
2. Distribution Strategy

According to Evans and Danks,"distribution is a linkage between the firm's customers and the sources of its products and services that the firm provides to the market place". It not only deals with decisions regarding the distribution cost (which forms a major percentage of marketing cost), but also considers long-term commitment with certain channels of distribution along with their associated costs. It consists of three elements as follows,

(i) Channel selection

(ii) Configuration of supply chain and

(iii) Distribution planning.



3. Inventory Strategy

Such strategies mainly deal with inventory decisions. Firms have to face several issues such as whether to stock products or not, if yes, how much volume of inventory has to be maintained. If no, then how the demands of customers can be met. Such issues are often conflicting with each other which has to be resolved as early as possible so that firms carryout smooth flow of operations. Inventory strategy is a cluster of following three elements,

(i) Demand Forecasting

(ii) Inventory Planning

(iii) Planning of Stocking Facilities.

4. Customer Service Strategy

Evans and Danks, have rightly described customer service strategy as a means/channel to respond to the needs and expectations of its customers in a manner that maximizes profitability. Nowadays firms are treating customers as "the most precious asset". Nature of customer service is a differentiating factor in this competitive environment, where firms are no more considered for selling of their products but are known as sellers of relationships, solutions, support and care. Hence, firms need to provide efficient customer service by providing post-warranty support, fast repairs, quick customer responses in returns of their service calls, by competent and user-friendly technicians. Following are the factors responsible for the development of customer service strategy,

(i) Identification of service needs

(ii) Service cost

(iii) Revenue management.

5. Integration Strategy

Traditionally, both suppliers and manu- facturers were operating independently but in recent times, supply chain acts as a liaison between the manufacturers and suppliers where products/services are delivered by combining the efficiencies of both the parties. The degree of integration process is directly proportional to the success of supply chain system i.e., the higher the integration process, the greater is the success of a supply chain system. Integration is of three different types,

(i) Information integration

(ii) Decision integration and

(iii) Financial integration.

1.8 BEST PRACTICES IN SCM

Q18. Explain the best practices in supply chain management.

Ans : **(Imp.)**

1. Recruit & Develop Supply Chain Professionals

Emerging technology and an increasingly globalized supply chain are driving forces in the evolution of supply chain processes, but the skilled workers needed to run these operations are in short supply. In fact, only 38% of supply chain leaders are confident in their current supply chain team's abilities to compete in today's market.

Overcoming this shortage of skilled workers and closing the skills gap requires effectively finding new talent with the required knowledge. To achieve this, many supply chain leaders are hiring staffing companies that specialize in supply chain recruitment. Building relationships with universities to establish a pipeline of students in supply chain, logistics and project management programs for internships, entry-level positions and professional development is another effective avenue for sourcing talent with the necessary skills.

2. Align the Supply Chain Team

Effective cross-business execution is integral to establishing an efficient supply chain. However, too often, each function of the supply chain operates like a distinct entity, separated by business units, varying priorities, disparities in time and resources, siloed systems and procedures and even geography. That often leads to information gaps, slow communication, errors and inconsistent processes.

3. Establish Alliances with Suppliers

Building strong partnerships with suppliers is vital to supply chain success, often saving expenses and improving reliability. If both sides treat this as a partnership, these relationships should be equally beneficial. That requires balanced problem resolution and co-creating goals that help both parties achieve their objectives.

Companies should also look for suppliers that share the same values and principles beyond the basics, such as expertise, pricing and timeliness in vetting supply partners. Things like environmental sustainability and social responsibility are essential points of agreement, as scandals like labor law violations can have a damaging impact on the companies they serve.

4. Purchase Supplies in Volume to Reduce Costs

Taking advantage of economies of scale can be a cost-effective way to purchase inventory. Understanding demand from all areas of the business and making a single purchase lowers supply chain costs via volume discounts and reduced administrative and warehousing labor costs compared to multiple supply purchases.

5. Diversify Supplier Relationships to Avoid Delays

Supplier-side delays are one of the most common reasons for supply chain disruptions. A lack of availability of raw materials, import/export issues, weather and natural disasters, political and regulatory issues and other unforeseen obstacles can all slow down or even cease the delivery of supplies.

6. Track Supply Chain Metrics

Supply chain managers need to establish specific parameters by which they can quantify supply chain performance. These key performance indicators (KPIs) allow businesses to identify and analyze strengths and inefficiencies to enable data-supported goals. Among the most critical metrics are:

- **Perfect Order Rate**

  This measures a supply chain's ability to deliver error-free orders. That means orders that arrive on time, in full, containing the correct items. A perfect order rate has one of the biggest impacts on the bottom line, as it directly affects customer satisfaction and retention.

- **Warehousing Costs**

  This metric is critical for establishing a financially efficient supply chain. It encompasses all of the costs related to warehouse operations, including labor, rent and utilities, equipment, shelving and pallet racks and technology. Supply chain managers should review this KPI regularly and make adjustments as necessary. However, businesses should analyze any cost-cutting on warehousing expenses to understand its impact on other areas of the supply chain.

- **Inventory-to-Sales Ratio**

  This KPI measures the amount of inventory available for sale compared to how much is sold and helps businesses avoid over- or under-stocking items. It's calculated by dividing the amount of available inventory by the amount sold and then multiplying that result by 100 for a percentage.

- **Inventory Velocity**

  This looks at the amount of inventory projected to sell within a given time frame, often a quarter or year. It is calculated by dividing the inventory count at the beginning of the period by the sales forecast. This metric helps supply chain managers optimize inventory levels by showing them how quickly items need to be restocked.

- **Supply Chain Cycle Time**

  This metric calculates the overall efficiency of the supply chain. Shorter cycles are more efficient, leading to competitive advantages. Longer cycles can indicate bottlenecks or other pain points that need to be addressed. Finding the supply chain cycle time requires supply managers to measure how long each step of the supply chain takes, from sourcing suppliers and order placement to customer delivery and final payment. It assumes inventory levels of zero and is calculated by adding the time each stage of the supply chain takes together. It's most helpful to use the longest lead time for each stage, as that provides more wiggle room for delays.

7. Increased Supply Chain Visibility

Constant communication, timely updates and reliable documentation are crucial to an efficient supply chain. Businesses need true end-to-end supply chain visibility and must account for every aspect, including suppliers, partners, warehouses and shipping carriers. Real-time data sharing across the supply chain provides a bird's-eye view of the entire chain and more granular information about each node. The benefits of this visibility even reach the customer in the form of real-time tracking of deliveries.

8. Centralize Document Management

Managing purchase orders, customs paperwork, inspection reports, bills of lading and other supply chain documentation can be a complicated process. Since supply chain documentation involves multiple business units, it often suffers from inconsistencies, disconnects and misalignment of processes and goals due to siloed functions and departments. That creates confusion and can reduce responsiveness while increasing errors.

Investing in a solution that provides a centralized hub for all supply chain documentation and serves as a comprehensive source for decision-makers to review and manage all of a company's supply chain activities can provide greater clarity over end-to-end processes while eliminating ad-hoc, disparate document management.

9. Improve Order-to-Pay Process

The order-to-pay process, also known as the procure-to-pay process, encompasses all of the steps involved in an order, from requisition to final payment. This process usually includes various departments across the company, including finance, sales, warehousing and logistics, all of which are likely using different systems to fulfill their requirements. If

operations are fragmented, this can cause many challenges, namely data discrepancies, lack of responsiveness and misalignment of activities.

Addressing these challenges might involve companies automating the order-to-pay processes with a unified platform that can simplify the entire process by addressing each step. Everything from vendor management and the issuance of purchase orders to delivery and final payment recording can be centralized and automated, improving visibility across the entire cycle, driving key insights and boosting efficiency.

10. Focus on Total Cost of Ownership (TCO)

The total cost of ownership (TCO) encompasses all of the costs associated with every aspect of the supply chain. It's how businesses account for each activity's costs within the supply chain, including material acquisition, storage, selling, transportation, currency exchange costs, trade incentives and restrictions.

The key to making adjustments in this area is to use the TCO to make informed decisions with all of the supply chain nodes and other business units that take a part in strategic decisions. That's because there are usually unforeseen consequences to cutting costs to simply achieve a lower TCO. If, for example, a delivery partner can provide a low purchase price for bulk orders, but there's not enough storage space in the warehouse, then the cost may increase due to the additional staff and space needed to organize and house the items (including potentially paying a third party to hold the inventory).

1.9 OBSTACLES OF STREAMLINED SCM

Q19. Discuss the Obstacles of Streamlined SCM.

Ans : **(Imp.)**

The following are the Obstacles of Streamlined SCM.

1. Juggling multiple systems to complete the same task

When information is fragmented across different applications and tools, operational delays become inevitable. For example, a team might end up checking several carrier systems for updates while sharing error-laden spreadsheets via email.

Reconciling all of this data saps valuable time. It also complicates tasks such as procurement and supply planning, producing considerable inefficiencies that drive up costs for workflows such as freight invoicing.

Ideally, such islands of information can be consolidated without having to resort to onerous manual processes. Integrated supply chain solutions implemented by a trusted partner such as Inspirage will put you on the track to a more cost-effective, scalable and transparent supply chain management solution.

2. Outsourcing logistics visibility to third parties

Outsourcing to third party logistics providers is unavoidable in some industries, not to mention a practical necessity among large organizations with national or even global footprints. At the same time, ineffective third-party partnerships can become a major drag on overall supply chain visibility, with cascading effects across the whole enterprise.

Relying on outside help for logistics visibility creates issues similar to those we raised in the first item above:

Namely, time-consuming and expensive fragmentation. In contrast, having data points such as carrier commonly available in a platform such as Oracle Transportation Management greatly simplifies transportation management.

The results often speak for themselves. A more streamlined supply chain is both economical and easy to manage, thanks to features such as centralized data repositories.

3. Working with outdated technology

Have you ever researched a product on a retailer's website, checked to verify that it's available at a specific location, visited that store and discovered instead that the item is out of stock? There are many reasons for such discrepancies, with lack of an up-to-date data near the top of the list.

While consumers regularly engage with organizations across multiple devices and platforms, companies do not always possess the right tools to keep pace. Accordingly, they might have to lean on decades-old ERP systems and complex customizations, which together contribute to difficulties in meeting product demand, allocating costs for parts and ensuring that publicly viewable indicators of store stock (e.g., on an e-commerce site or in a mobile app) are accurate.

4. Paying too much for essential services

As a result of these flaws and many others, many organizations end up with a supply chain burdened by costs and incapable of adapting to evolving requirements. Overpaying for freight invoices is a prime example of a pitfall opened up by inefficient supply chain management: much of the cost of paying for these items can be eliminated with the right pairing of processes and tools.

The good news is that you have worthwhile options for modernizing your approach to supply chain management. Inspirage is an end-to-end Oracle partner with a long track record of ensuring industry- appropriate implementations that finish on time and on budget.

1.10 Green Supply Chain Management

Q20. Explain briefly about Green Supply Chain Management.

Ans :

- Green supply chain management integrates environmental factors into different supply chain activities, including product design, material sourcing and selection, manufacturing procedures, transportation to the end users, and management of the green product's end of life.
- Green design involves designing products with minimum material or energy consumption. The green design also incorporates the reuse, recovery, or recycling of products or parts. In addition, the green design also considers the negative impacts on the environment in a product's life cycle. Green manufacturing minimizes waste and pollution during production activities.
- Green logistics includes environment-friendly transportation, distribution, and alternative fuel options.
- In short, environmental, social, and economic aspects are considered the objectives in measuring the performance of GSCM, as shown in Figure.

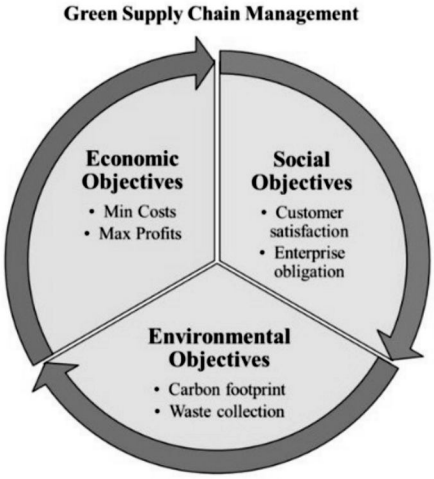


Fig.: Three objectives of green supply chain management.

Objectives

- Green supply chain management can improve environmental performance, although the relationship depends on organizational capacity.
- However, the relationship between environmental and economic performance is often conflicting in nature. In many cases, enterprises would often like to maximize profits and minimize carbon emissions.

- However, maximizing profits by increasing supply chain activities often produces higher carbon emissions.
- It is essential to understand the relationship between social aspects, green supply chain management, and operational performance.
- Enterprises often struggle to understand the direct link between green supply chain management adoption and the subsequent enhanced performance in operational, economic, or environmental areas.
- Thus, adopting green culture on a broad scale is often challenging to implement efficiently.

Q21. What are the elements of Green Supply Chain Management?

Ans :

The following are the elements of Green Supply Chain Management

1. Green Procurement

- Green procurement is defined as an environmental purchasing consisting of involvement in activities that include the reduction, reuse and recycling of materials in the process of purchasing.
- Besides green procurement is a solution for environmentally concerned and economically conservative business, and a concept of acquiring a selection of products and services that minimizes environmental impact in a multinational investigation identified key factors for green purchasing including providing design specification to suppliers that include environmental require- ments for purchased items, cooperation with suppliers for environmental objectives, environmental audits for supplier's internal management, and suppliers' ISO14001 certification.

2. Green Design

- Green design has been used extensively in the literature to denote designing products with certain environmental considerations.
- It is the systematic consideration of design issues associated with environmental safety and health over the full product life cycle during new production and process development. Its scope encompasses many disciplines, including environmental risk management, product safety, occupational health and safety, pollution prevention, resource conservation and waste management.
- A common approach is to replace a potentially hazardous material or process by one that appears less problematic.
- This seemingly reasonable action can sometimes be undesirable if it results in the rapid depletion of a potentially scarce resource or increased extraction of other environmentally problematic materials.

3. Green Operations and Reverse Logistics

- Green operations relate to all aspects related to product manufacture/remanufacture, usage, handling, logistics and waste management once the design has been finalized.
- Some of the key challenges of GSCM such as integrating remanufacturing with internal operations, understanding the effects of competition among remanufacturers, integrating product design, product take-back and supply chain incentives, integrating remanufacturing and reverse logistics with supply chain design in this define reverse logistics as 'the process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal.
- Reverse logistics activities differ from those of traditional logistics.
- Reverse logistics networks have some generic characteristics related to the coordination requirement of two markets, supply uncertainty, returns disposition decisions, postponement and speculation. Green distribution consists of green packaging and green logistics.

- Packaging characteristics such as size, shape, and materials have an impact on distribution because of their effect on the transport characteristics of the product.
- Better packaging, along with rearranged loading patterns, can reduce materials usage, increase space utilization in the warehouse and in the trailer, and reduce the amount of handling required.

4. Green Manu facturing and Remanu-facturing

- Green manufacturing is defined as production processes which use inputs with relatively low environmental impacts, which are highly efficient, and which generate little or no waste or pollution. Green manufacturing can lead to lower raw material costs, production efficiency gains, reduced environmental and occupational safety expenses, and improved corporate image.
- Green manufacturing aims to reduce the ecological burden by using appropriate material and technologies, while remanu-facturing refers to an industrial process in which worn-out products are restored to like-new condition.
- Remanufacturing is defined as recycling integrated manufacturing. Industries that apply remanufacturing typically include automobiles, electronics and types. Product recovery refers to the broad set of activities designed to reclaim value from a product at the end of its useful life.

5. Waste Management

- Waste management can be said as the reduction of perilous waste which is generated as a by-product of the production process and operations and subsequently treated, arranged or disposed off.
- Waste reduction can be done at source or prevention of pollution at every step of the organization's procedures.
- Waste management helps to prevent the formation of waste rather than managing it after it is generated. Effective waste management needs to focus on 'preventing' pollution at the source in products as well as manufacturing processes rather than 'removing' it after it has been created.
- Firms can control waste through efficient usage of water instead of having to wait until the waste has accumulated. In addition, disposal cost, especially for equipment has always been a compelling problem and has led to green consciousness. Firms need to ensure that they utilize whole life costing when procuring equipment, by taking disposal measures and costs into account.

1.11 Supply Chain Sustainability

Q22. What is Supply Chain Sustainability? How to improve Supply Chain Sustainability?

Ans : **(Imp.)**

Meaning

- Supply Chain Sustainability (SCS) is a holistic view of supply chain processes, logistics and technologies that addresses the environmental, social, economic and legal aspects of a supply chain's components.
- Factors that affect SCS include amount of waste, carbon footprint and emissions, air pollution, labor violations, deforestation and the health and safety of workers. SCS is based on the principle that socially responsible products and practices are not only good for the planet and the people who live here, they are also good for building positive brand awareness, minimizing environmental impact and improving long-term profitability.
- An organization's supply chain connects inputs to outputs, outlining the process of producing and delivering consumer goods.
- Focusing on the supply chain is one aspect of achieving business sustainability as it covers a range of areas for improvement. This could include identifying the source of raw materials or surveying the conditions of workers involved in every process.
- Historically, supply chain was simply about logistics and knowing when and where goods

were moving, but the rise of the digital supply chain and accompanying visibility and analytics tools has provided companies with the ability to gather data about how well each component in the supply chain demonstrates corporate social responsibility.

- This transparency has promoted the concept of responsible sourcing and encouraged supply chain partners to develop and share best practices for green operations and logistics.
- It has also allowed prospective partners to demonstrate compliance with industry best standards for worker safety, environmental protection and business ethics.
- In large companies, the task of demonstrating supply chain sustainability may be given to a supply chain analyst or sustainability officer.
- In addition to developing and implementing programs and processes in support of sustainability, the job may also involve qualifying new suppliers, ensuring delivery and quality performance targets are achieved and supporting supplier diversity policies.

Improvement of Supply Chain Sustainability

Companies should take the following measures in order to achieve a more sustainable supply chain:

1. Identify critical issues and areas of improvement within the entire supply chain. The environmental impact of a supply chain is a culmination of each step in the production and operation process. Therefore, companies should understand where the most emissions and risks are located in order to improve.
2. Use supply chain management and measurement tools to help track progress and find weaknesses. Organizations such as The Sustainability Consortium, World Wildlife Fund and The Sustainability Accounting Standards Board have created guidelines and key performance indicators (KPIs) that can help consumer businesses move towards their environmental goals.
3. Set supply chain sustainability goals that reflect global sustainability goals. Companies should model efforts around scientific recommen- dations and government regulations to contribute the greatest impact to the global sustainability agenda and move towards being carbon neutral.
4. Choose and collaborate with other sustainable suppliers. The practice of collaboration and combination of resources between manufacturers can help organi- zations reduce waste, cost and environmental risks. For example, sharing modes of delivery can reduce pollution by ensuring multiple half-empty vehicles are not sent out in the same direction.
5. Maintain accountability throughout the process. Processes that can be put in place to ensure liability are routine audits, implementation of sustainability programs and teams, software tools that track impact and customer-facing goals and progress reports.
6. Purchase carbon offsets. Organizations that have less control over supply chain or want to begin making an immediate impact can also look into buying carbon offsets. These are credits that help negate an organization's carbon emissions by investing in environ- mentally-friendly initiatives.

Short Question and Answers

1. Supply Chain.

Ans :

- A supply chain is a system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer.
- A supply chain is a network of retailers, distributors, transporters, storage facilities, and suppliers that participate in the production, delivery and sale of a product to the consumer.
- These activities are associated with the flow and transformation of goods from the raw materials stage to the end user, as well as the associated information and funds flows.
- Supply chain activities transform natural resources, raw materials and components into a finished product that is delivered to the end customer.

2. Define Supply Chain Management.

Ans :

Supply chain management involves the integration of activities associated with the flow of information and raw materials from the production site till they reach the end-users (i.e., in the form of finished goods) by establishing effective supply chain relationships.

Due to globalization, SCM has become a necessity especially for the firms who are carrying out manufacturing activities to deliver products at low cost and at higher quality that their competitors do.

Definitions

The concept of supply chain management can be better understood with the following definitions,

(i) **According to Stock & Lambert (2001)** "Supply chain integrates the key business processes of an organization from end-user through original suppliers that provide products, services and information that add value for customers and other stakeholders".

(ii) **According to - Mohanty & Deshmukh (2004)** "A supply chain is a network of facilities and distribution options that are engaged in the procurement of raw materials, transformation of these materials into intermediate and finished products and finally distributing them among the ultimate customers".

3. Value Chain.

Ans :

- A value chain is a business model that describes the full range of activities needed to create a product or service.
- For companies that produce goods, a value chain comprises the steps that involve bringing a product from conception to distribution, and everything in between such as procuring raw materials, manufacturing functions, and marketing activities.
- A company conducts a value-chain analysis by evaluating the detailed procedures involved in each step of its business.

- The purpose of value-chain analyses is to increase production efficiency so that a company may deliver maximum value forthe least possible cost.

4. Cycle View of Supply Chain Management.

Ans :

Each cycle involves the customer stage placing an order and receiving it from the supplier stage once it has been supplied by it. In each cycle, two successive stages occur at the same time

(i) Cycle of Customer Orders

(ii) Replenishment Cycle

(iii) Manufacturing Cycle

(iv) Procurement Cycle

Cycle view clearly defines processes involved and the owners of each process. This cycle view specifies the roles and responsibilities of each member and the desired outcome of each process.

5. Push/Pull View of SCM

Ans :

A push/pull view of the supply chain categories processes based on whether they are initiated in response to a customer order (pull) or in anticipation of a customer order (push). This view is very useful when considering strategic decisions relating to supply chain design.

The processes in a supply chain are divided into two categories depending on whether they are executed in response to a customer order (pull) or in anticipation of a customer order (push). Supply chain processes fall into one of two categories depending on the timing of their execution relative to customer demand.

6. Procurement logistics.

Ans :

Procurement logistics consists of activities such as market research, requirements planning, make-or-buy decisions, supplier manage- ment, ordering, and order controlling. The targets in procurement logistics might be contradictory: maximizing efficiency by concentrating on core competences, outsourcing while maintaining the autonomy of the company, or minimizing procurement costs while maximizing security within the supply process.

7. Green Logistics

Ans :

Green Logistics describes all attempts to measure and minimize the ecological impact of logistics activities.

This includes all activities of the forward and reverse flows. This can be achieved through intermodal freight transport, path optimization, vehicle saturation and city logistics.

8. What is Supply Chain Strategy?

Ans :

- Supply chain strategy is a broader term which mainly focuses on the methods of operations of supply chain in order to achieve competitive edge over competitors.
- Supply chain strategy is a continuous process, in which operational components are continuously analyzed to assess their cost-benefit trade-offs.
- Supply chain strategy is mainly responsible for creating value for both the company as well as for its stakeholders.
- An effective supply chain strategy along with innovative technologies not only help in meeting the demands of the market but also help the firm to reach the highest level of customer satisfaction.

9. Green Supply Chain Management.

Ans :

- Green supply chain management integrates environmental factors into different supply chain activities, including product design, material sourcing and selection, manu- facturing procedures, transportation to the end users, and management of the green product's end of life.
- Green design involves designing products with minimum material or energy consumption. The green design also incorporates the reuse, recovery, or recycling of products or parts. In addition, the green design also considers the negative impacts on the environment in a product's life cycle. Green manufacturing minimizes waste and pollution during production activities.

10. What is Supply Chain Sustainability?

Ans :

- Supply Chain Sustainability (SCS) is a holistic view of supply chain processes, logistics and technologies that addresses the environ- mental, social, economic and legal aspects of a supply chain's components.
- Factors that affect SCS include amount of waste, carbon footprint and emissions, air pollution, labor violations, deforestation and the health and safety of workers. SCS is based on the principle that socially responsible products and practices are not only good for the planet and the people who live here, they are also good for building positive brand awareness, minimizing environmental impact and improving long-term profitability.
- An organization's supply chain connects inputs to outputs, outlining the process of producing and delivering consumer goods.

Choose the Correct Answers

1. The purpose of supply chain management is [c]
   (a) provide customer satisfaction
   (b) improve quality of a product
   (c) integrating supply and demand management
   (d) increase production

2. _____ refers to supply chain practices that strive to reduce energy and environmental footprints in terms of freight distribution. [b]
   (a) Inbound Logistics (b) Green Logistics
   (c) Outbound Logistics (d) SCM

3. _____ involves streamlining the distribution process in terms of physical and information efficiency. [b]
   (a) Technical Integration (b) Channel Integration
   (c) Channel Hierarchy (d) Vertical Marketing System

4. _____ is the task of buying goods of right quality, in the right quantities, at the right time and at the right price. [d]
   (a) Supplying (b) Scrutinizing
   (c) Selling (d) Purchasing

5. The major decision areas in supply chain management are [a]
   (a) location, production, distribution, inventory
   (b) planning, production, distribution, inventory
   (c) location, production, scheduling, inventory
   (d) location, production, distribution, marketing

6. Supply chain management has its own origin in operation of _____ Enterprise. [a]
   (a) Business (b) Trading
   (c) Non profit (d) Social

7. The goal of logistics is [d]
   (a) to achieve a target level of customer service at lowest possible cost
   (b) to achieve targeted level of customer service.
   (c) increase in the market share.
   (d) All of the above

8. Firm infrastructure is [a]

(a) a support activity (b) a primary activity.

(c) not an activity (d) the only activity

9. Inbound and outbound logistics is [b]

(a) a support activity (b) a primary activity

(c) not an activity (d) the only activity

10. HRM is in the generic value chain of logistics. [c]

(a) a support activity (b) a primary activity

(c) not an activity (d) the only activity

Fill in the Blanks

1. The supply chain, which is also referred to as the _____ network.
2. _____ involves a wide range of activities. Companies must first decide on their operations strategy.
3. _____ arrival means the arrival of a customer to the market to make a purchase of his or her choice.
4. _____ Logistics consists of the activities required to set up or establish a plan for logistics activities to occur.
5. _____ logistics has, as main tasks, the delivery of the finished products to the customer.
6. _____ logistics denotes all those operations related to the reuse of products and materials.
7. _____ chain strategy is a continuous process, in which operational components are continuously analyzed to assess their cost-benefit trade-offs.
8. _____ fit is an important determinant of a supply chain strategy or design phase.
9. _____ is a linkage between the firm's customers and the sources of its products and services that the firm provides to the market place.
10. _____ has been used extensively in the literature to denote designing products with certain environmental considerations.

ANSWERS

1. Logistics
2. Planning
3. Customer
4. Advance
5. Distribution
6. Reverse
7. Supply
8. Strategic
9. Distribution
10. Green design

Very Short Questions and Answers

1. Supply Chain.

Ans :

In simple terms, a supply chain is the link between a firm or business and its suppliers and customers.

2. Value Chain.

Ans :

A value chain is a business model that describes the full range of activities needed to create a product or service.

3. Disposal logistics.

Ans :

Disposal logistics has as its main function to reduce logistics cost(s) and enhance services related to the disposal of waste produced during the operation of a business.

4. Chain Strategy.

Ans :

Supply chain strategy is a broader term which mainly focuses on the methods of operations of supply chain in order to achieve competitive edge over competitors.

5. Green Procurement.

Ans :

Green procurement is defined as an environmental purchasing consisting of involvement in activities that include the reduction, reuse and recycling of materials in the process of purchasing.

UNIT II

Logistics: Evolution, Objectives, Components and Functions of Logistics Management, Difference between Logistics and Supply Chain, Distribution related Issues and Challenges. Gaining Competitive Advantage through Logistics Management, Transportation: Functions, Costs, and Mode of Transportation Network and Decision, Models, Containerization, Cross Docking, Reverse Logistics. Outsourcing: Nature and Concept, Strategic Decision to Outsourcing, Third-party Logistics (3PL), Fourth-party Logistics (4PL).

2.1 LOGISTICS

2.1.1 Evolution

Q1. Define Logistics and Logistics Management. Explain the evolution of Logistics Management.

Ans : **(Imp.)**

Meaning

- The word logistics has originated from the Greek word logistikos and the Latin word logisticus, meaning the science of computing and calculating. In ancient times it was used more in connection with the art of moving armies, and supplies of food and armaments to the war front. During World War II logistics gained importance in army operations, covering the movement of supplies, men and equipment across the border.
- Today, logistics has acquired a wider meaning and is used in business for the movement of raw materials from suppliers to the manufacturer and finally the finished goods to the consumers. logistics is the art and science of managing and controlling the flow of goods, energy, information, and other resources.

Definitions

(i) According to Council of Logistics Management (CLM), "Logistics is the process of planning, implementing -add controlling the efficient, cost-effective flow and storage of raw material in-process inventory, finished goods and related information from point of origin to point of consumption for the purpose of confirming customer requirements".

(ii) According to Robert A. Novack, "Logistics is an activity involving the creation of time, place, form and possession of utilities within and among firms and individuals through strategic management with the goal of creating products/services that satisfy customer through attainment of value":

(iii) Logistics is the process of strategically managing the procurement, movement and storage of materials, parts and finished inventory (and the related information flow's) through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost-effective fulfillment of orders.

(iv) A formal definition of logistics management can be, "The design and operation of the physical, managerial, and informational systems needed to allow goods to overcome time and space (from the producer to the consumer).

Evolution

- Logistics is the word used now and then; in this post let us discuss how the word and the whole process of logistics have evolved. The word logistics is the combination of two Latin words 'logic' and 'static'.
- During the earlier periods, logistics was a military application. However, it became more popular at the time of World War II and after that logistics was viewed and applied as a scientific subject. Once the enterprise businesses understood the importance of logistics, they started to take advantage of

logistics services. From the beginning of the 1960s until the present year the logistics have kept on evolving.

- Logistics can be easily defined as "efficient planning and implementation of products, services, and information flow from the starting point (origin) to the endpoint (customers) including transport, storage, and control".
- The globalization has increased by the 1990s and companies have to import and export a lot. Thereby transportation has become an important factor for business.
- Every business considered transportation as a key factor to maintain them in the competitive market and they controlled and integrated transport systems. When transportation was viewed strategically important, the businesses started losing their market shares.
- To overcome the above-mentioned situation and to maintain market competitiveness the field of 'logistics management' was emerged.
- Logistics management includes every stage of transportation from the beginning to the end. Once the globalization has taken a turn, every company is either a buyer or a seller.
- The goal for every business is to find the shortest, fastest and most cost-effective way to sell their products all around the world.
- To buy and sell products between countries they must rely more on logistics. The reason is that every country needs logistics because every country has become a potential market by then. So since the evolution, logistics has a growth rate of up to 20% every year.
- Later the supply chain department was created within the logistics to provide complete services beginning from the planning to the end of the product cycle. This is how the complete logistics and supply chain management industry emerged. It is booming and will keep booming for many years to come.

2.1.2 Objectives

Q2. Explain the objectives of logistics management.

Ans :

The following are the objectives of logistics management.

1. Improving Customer Service

The marketing concept assumes that profits maximization can be achieved in long run through maximizing the customer satisfaction. An efficient management of physical distribution can help in improving the level of customer service by developing an effective system of warehousing, quick and economic transportation, all maintaining optimum level of inventory.

2. Rapid Response

It is concerned with a firm's ability to satisfy customer service requirements in a timely manner. Information technology has increased the capability to postpone logistical operations to the latest possible time and then accomplish rapid delivery of required inventory. The result is elimination of excessive inventories traditionally stocked in anticipation of customer requirements.

3. Reduce Total Distribution Costs

Another most commonly stated objective is to minimize the cost of physical distribution of the products. The cost of physical distribution consists of various elements such as transportation, warehousing, and inventory maintenance and any reduction in the cost of one element may result in an increase in the cost of the other elements. Thus, the objective of the firm should be to reduce the total cost of distribution and not just the cost incurred on any one element. For this purpose, the total cost of alternative distribution systems should be analyzed and the one which has the minimum total distribution cost should be selected.

4. Reliable and Consistent Delivery Performance

Timely delivery is crucial to the customer to keep up his production schedule; he is not interested in the delivery of material ahead

of schedule. This area of operation is subject to variance. The other objective of logistics should be consistency in delivery performance; this will help in building customer confidence and contribute to creating long-term relationships.

5. Minimum Product Damages

Product damage ads to the logistical cost. The reason for product damages are improper logistical packaging, frequent consignment handling, absence of load unitizing etc. The use of mechanized material handling equipment, load unitization and proper logistical packaging will reduce product damages.

6. Generating Additional Sales

Another important objective of the physical distribution/logistics system in a firm is to generate additional sales. A firm can attract additional customers by offering better services at lowest prices. For example, by decentralizing its warehousing operations or by using economic and efficient modes of transportation, a firm can achieve larger market share.

7 Creating Time and Place Utilities

The logistical system also aims at creating time and place utilities to the products. Unless the products are physically moved from the place of their origin to the place where they are required for consumption, they do not serve any purpose to the users. Similarly, the products have to be made available at the time they are needed for consumption. Both these purposes can be achieved by increasing the number of warehouses located at places from where the goods can be delivered quickly and where sufficient stocks are maintained so as to meet the emergency demands of the customers. Moreover, a quicker mode of transport should be selected to move the products from one place to another in the shortest possible time. Thus, time and place utilities can be created in the products through an efficient system of physical distribution.

8. Price Stabilization

Logistics also aim at achieving stabilization in the prices of the products. It can be achieved by regulating the flow of the products to the market through a judicious use of available transport facilities and compatible warehouse operations. For example, in the case of industries such as cotton textile, there are heavy fluctuations in the supply of raw materials. In such cases if the market forces are allowed to operate freely, the raw material would be very cheap during harvesting season and very dear during off season. By stocking the raw material during the period of excess supply (harvest season) and made available during the periods of short supply, the prices can be stabilized.

9. Quality Improvement

The long-term objective of the logistical system is to seek continuous quality improvement. Total Quality Management (TQM) has become a major commitment throughout all facets of industry. Overall commitment to TQM is one of the major forces contributing to the logistical renaissance. If a product becomes defective or if service promises are not kept, little, if any, value is added by the logistics. Logistical costs, once expended, cannot be reversed. In fact, when quality fails, the logistical performance typically needs to be reversed and then repeated. Logistics itself must perform to demanding quality standards.

10. Lifecycle Support

A good logistical system helps to support the lifecycle. Few items are sold without some guarantee that the product will perform as advertised over a specified period. In some situations, the normal value added inventory flow toward customers must be reversed. Product recall is a critical competency resulting from increasingly rigid quality standards, product expiration dating, and responsibility for hazardous consequences. Return logistics requirements also result from the increasing number of laws prohibiting disposal and encouraging recycling of beverage containers and packaging materials.

11. Movement Consolidation

As the logistical system aims at cost reduction through integration, consolidation, one of the most significant logistical costs is transportation. Transportation cost is directly related to the type of product, size of shipment, and distance. Many logistical systems that feature premium service depend on high speed, small shipment transpor-tation. Premium transportation is typically high cost. To reduce transportation cost, it is desirable to achieve movement consolidation. As a general rule, the larger the overall shipment and the longer the distance it is transported, the lower the transportation cost per unit. This requires innovative programs to group small shipments for consolidated movement. Such programs must be facilitated by working arrangements that transcend the overall supply chain.

12. Inventory Reduction

Inventory is one of the prime factors that can adversely affect the bottom line of an enterprise. Through the financial accountancy perspective, inventory is an asset and does not cause any appreciable disadvantage, even when stocked in excess. Traditionally, firms carry excess inventory for the purpose of extending excellent customer service. However, inventory, being an asset, requires investment to possess it. The funds thus invested are blocked and cannot be used for any other productive purpose. Moreover, there is a capital cost associated with it. The carrying cost will be equivalent to the interest on the funds at the bank borrowing rates currently applicable. The carrying cost will be a drain on the enterprise s profits. Hence, the prime objective of logistics is to maintain the inventory at the minimum level.

2.1.3 Components

Q3. Explain the components of logistics management.

Ans :

The following are the components of logistics management.

1. Demand Planning

Determining all the aspects of logistics is important to maintain a balance between demand and supply. The flow of goods is not interrupted by logistics management as it ensures that operations are well-planned. Therefore, facilitating the management logistics process allows organizations to evaluate and forecast the demand for goods and services in SCM.

Proper planning is a major component of the supply chain that can eliminate the insufficient or improper supply of goods. It involves activities like warehousing, material handling, and storage for managing the logistics functions effectively. Similarly, goal is to analyze historical data, statistical forecasting, and overall product lifecycle for staying in front of market shifts.

2. Storage and Material Handling

In the contemporary world, the demand in the market is volatile so it is essential that there should be surplus goods to fulfill the sudden requirements of the customers. The goods or materials should be stored and preserved correctly. Warehouse management systems (WMS) are extremely important to ensure that goods are easy to store, move, and transport.

WMS optimizes the storage capacities, and equipment, and lowers the distribution and transportation costs which is beneficial for the smooth running of supply chain operations. Also, the goods which are not handled properly can get flawed which can cause redundant financial loss to the business. Therefore, it is considered to be an essential component of logistics management.

3. Inventory Management

Inventory levels are checked regularly by the companies to monitor the flow of goods in and out of a warehouse. It evaluates and identifies how much stock to order at what time and where it should be stored. Therefore, maintaining an efficient inventory level is majorly crucial to fulfilling customer

requirements. Therefore, with proper inventory management, companies can ensure that they do not have too much or too little stock on hand. It even predicts the consumer demand which leads to efficient order planning and organizing.

Automated inventory control and management control the operations within the supply to make processes easy and convenient. Also, inventory management systems play a crucial role in optimizing stock levels. Strategic planning and real-time monitoring of inventory are one of the most important components of logistics.

4. Fleet Management

Managing and monitoring commercial vehicles is an essential component of logistics as it involves activities like asset utilization, improving maintenance planning of fleets, and managing costs. Nowadays, companies are investing in fleet management software for improving the efficiency of the fleets and drivers.

It provides real-time updates and insights to fleet owners by using technological advancement solutions. Also, it is an effective way of improving the safety conditions of drivers and vehicles. Therefore, the fleet management system tends to provide all the information associated with the fleets through predictive analytics and accurate reporting.

5. Transportation Management

It is the most important component of logistics management as it plans and supports the distribution of goods to their final destination. It can be delivered via freight trains, road vehicles, shipping, and so on. Optimizing the transportation ensures that the goods or items have reached the end-user on time.

It even manages the reverse flow of goods so investing in a transport management system can be beneficial for the organization's growth. It yields several benefits such as cost reduction, reduced carbon footprints, timely deliveries, and so on. Some organizations also prefer consolidation as it is a process of combining multiple smaller shipments in one. Therefore, this can enhance customer services as they can receive the products on time or even before time.

6. Information and Control

Implementing new age technologies is considered to be the future of the logistics industry. Software and processes provide data-driven insights that help companies to manage supply chains more efficiently. It tends to forecast demands, and transportation times, and allow companies to make better cost-effective decisions. Maintaining the flow of information is necessary to get useful insights and manage the demand more accurately. However, businesses are embracing advanced technologies like Artificial Intelligence, the Internet of Things, Big Data, and Blockchain to achieve transparency in the entire supply chain. Therefore getting the right information and control over the logistics operations plays a pivotal role in executing each one of these components.

2.1.4 Functions of Logistics Management

Q4. Explain the Functions of Logistics Management.

Ans : **(Imp.)**

Functions

The logistics management has the following functions :

1. Procurement /Purchasing

Procurement is the process of buying goods and services for the user department based on order specifications given by that department. Procurement begins with sending the purchase order to the supplier. The procurement function involves various activities such as identifying new suppliers, qualifying the suppliers, negotiating terms and conditions of supply, organizing delivery of orders, arranging for insurance, finalizing the mode of payment, and sending the purchase order to the supplier. This function is considered to be a support function in logistics. It also involves monitoring the performance of the suppliers for adherence to quality standards as the quality of inputs in the form of parts supplied by the suppliers, affects the quality of the final product.

2. Transporting

The importance of transportation in physical distribution originates from a variety of factors. Transportation confers 'time utility' and 'place utility' to the product; it determines the company's customer service; it also has a crucial bearing on the other elements of physical distribution and marketing, like warehousing, inventory control and channel management. Finally, transportation is also a very important cost element in most businesses.

3. Warehousing

Any firm can choose to either have its own dedicated network of warehouses or share space with others in third party operated warehouses. The former offers greater flexibility in design to meet product characteristics and storage needs, greater control over warehouse operations, effective market feedback and lower cost per unit as opposed to a third party arrangement. However, third party warehouses require no fixed investment by the firm. Also flexibility in location and space utilization make this an attractive alternative. Customer service can be improved significantly through this approach. These are also called distribution centers.

4. Managing Inventory

Inventory management is the third major component of physical distribution task. It will be obvious that without effective management of finished product inventory, it is impossible to run any business efficiently and profitably.

Inventory levels represent a major market-logistics decision. Salespeople would like their companies to cany enough stock to fill all customer orders immediately. However, this is not cost effective. Inventory cost increases at an increasing rate as the customer service level approaches 100 percent. Management would need to know by how much sales and profits would increase as a result of carrying larger in ventories and promising faster order fulfillment times, and then make a decision.

Inventory decision-making involves knowing when to order and how much to order. As inventory drawn, management must know at what stock level to place a new order. This stock level is called the order (reorder) point. An order point of 20 mean reordering when the stock falls to 20 units. The order point should balance the risks of stock out against the costs of overstock.

5. Material Handling

Material handling is the area of physical distribution that has experienced the greatest change and improvement in efficiency. Two major changes took place in this area:

i) **Elimination of Man Handling:** The first improvement was the replacement of man handling by machine handling but still it is used in retail of final buyer stage. Improved conveyer systems and left equipments have changed to total mechanization.

ii) **Containerization:** The second improvement in material handling was containerization. It is a method by which a large number of units of a product are combined into a single compact unit for storage and transportation. It reduced material handling cost and time spent.

Material handling decisions and costs are also interrelated with other decisions and costs. Use of improved handling equipments and containerization will naturally increase the efficiency and reduce the wastage and costs. It also makes best utilization of space in storage, possibles.

6. Order-Sizing

This is also a complicated problem in physical distribution decisions. Orders of less quantity (less than a container) will increase the cost of handling because the handling process will be done entirely by hand instead of machines. It will increase costs and consume more time. Less titan container size orders increase the costs of storage and inventory control and add to their complexity. It may also affect the cost of transportation because transportation charges will be lower for bulk quantity. Hence, management must make order size decisions concerning minimum order sizes, units in increment in order sizes, and preferred order sizes.

7. Order Processing

The methods, a concern uses for processing customers' orders affects its service to them in two ways:

i) Recorder time is affected, and

ii) Consistency of Delivery time is affected.

Variations in these two variables affect the profits of the buyers through changing their required investment in inventory, changing their ordering costs and altering the probability that they will be out of stock. Hence, buyers tend to shift their order to other suppliers providing better processing services.

Thus, the management of physical distribution involves the above decision areas which affect the costs and profit of the company. However, the manufacturer cannot control the process of physical distribution fully because there are so many other variables which are beyond his control. But in any way, an ideal mix should be prepared and used.

8. Recycling, Returns, and Waste Disposal:

This function comprises the reverse logistics process. While the logistics process moves materials and goods from the manufacturer to the customer, reverse logistics is the process in which the materials and goods move from the customer back to the manulacturer. This may happen in four situations:

i) When the goods comprise material or parts of material that can be recycled to produce the same product (for example, paper, glass, polythene bags, etc.),

ii) When the products are defective and have to be returned to the company,

iii) When the product is transported in packaging or containers that are returned to the manufacturer to use for sending a fresh batch of products (for example, Bibo water cans, Coca-Cola, Pepsi bottles, etc), and

iv) When the waste generated from the product has to be effectively disposed of by the manufacturer or a third party firm to prevent it from causing harm to the environment.

Q5. Explain the importance of logistics management.

Ans : **(Imp.)**

The significance of logistics management is:

1. Confers Place and Time Utility on Products

It is physical distribution that confers place-utility and time utility to a product by making it available to the user at the right place and at the right time. Thereby, it maximizes the chance to sell the product and strengthen the company's competitive position.

2. Physical Distribution becomes More Crucial

In some cases, production locations are totally dictated by considerations, like proximity to sources of raw material. As a result, the points of production might be far away from the markets for the product. In some cases, huge production capacities get established at a given location on considerations of technology and economies of scale. In all such cases, the product has to be marketed over an extended territory; it has to be transported over long distances, stored for a considerable length of time and sold. Then, there are products, which are impacted by the seasonality factor - either production is continuous but demand is seasonal, or demand is continuous but production is seasonal. Here too, physical distribution becomes particularly crucial. It has to perform the balancing act between production and consumption.

3. Helps to build Clientele

It is physical distribution that determines the customer service level to a large extent. As a result, it serves as a vital tool in building clientele/market for the product. And conversely, ineffective physical distribution leads to loss of customers and markets.

4. Promising Area for Cost Reduction

Physical distribution is a fertile area for cost savings. Over the years, in most businesses, physical distribution costs have grown into a sizeable chunk of the total costs and now ranks second among all cost elements, next only to material costs and surprisingly, it has remained one of the neglected areas of cost control.

5. Form Utility

It refers to the value added to goods through a manufacturing. Production, or assembly process. Form utility results when raw materials are combined in some predetermined manner to make a finished product.

2.2 Difference Between Logistics and Supply Chain

Q6. Compare and contrast Supply Chain management and Logistics management.

Ans : **(Imp.)**

Sl.No.	Supply Chain Management	Logistics Management
1.	Supply chain is viewed as a single entity rather than a series of fragmented elements such as procurement, manufacturing, distribution, etc.	Logistics is always viewed as a series of fragmented elements in most forward -looking companies. The real change is that both the suppliers and the end users are included in the planning process, thus going outside the boundaries of a single organization in an attempt to plan for the supply chain as a whole.
2.	SCM is focused on the integration of all business processes that add value for customers.	Logistics, on the other hand, is focused on moving and storing activities, as products and information wind their way through the supply chain to customers.
3.	SCM is based on the external relationships between the players in the entire supply chain and focuses on how to improve trading in general. The SCM concept thus provides a broader perspective across the supply chain than has been traditional approach within logistics.	Logistics is typically based on the individual business with the objective of making this enterprise's logistics system more efficient through internal and external planning and control.
4.	SCM is based on the external relationships between the players in the entire supply chain and focuses on how to improve trading in general. The SCM concept thus provides a broader perspective across the supply chain that has been the traditional approach within logistics.	Logistics is typically based on the individual business with the objective of making this enterprise's logistics system more efficient through internal and external planning and control.
5.	Supply Chain Management is a modern concept.	The concept of Logistics has been evolved earlier.

2.3 Distribution Related Issues and Challenges

Q7. Explain the challenges of logistic management.

Ans : **(Imp.)**

The following are the challenges of logistics management are:

1. Customer Service

Logistics management is about providing the right product in the right quantity to the right place at the right time. One of the significant challenges in the logistics industry is that customers want full transparency into where their delivery is at every point in transit. A customer's shipment location is currently as interconnected as your social network. As customer expectations have increased, their

willingness to pay for fast shipping has decreased, with about 64 percent of consumers unwilling to pay anything extra for less than two-day shipping.

2. Transportation Cost Control

Another significant logistics challenge for logistics managers is controlling costs in your transportation budget. Fuel prices are among the highest, contributing factors to transportation budget concerns. This year, higher fuel prices will likely increase transportation costs for U.S. shippers by pushing fuel surcharges. Additionally, rising U.S. diesel fuel prices are fuel surcharges added to freight rates, reversing a two-year trend that cut into the revenue and earnings of truckers as fuel prices plummeted.

3. Planning & Risk Management

To stay as efficient and effective as possible, periodic assessments and optimizations of each business sector are necessary. The adjustments are put in place in response to changes in the market, such as new product launches, global sourcing, credit availability, and the protection of intellectual property. Managers must identify and quantify these risks to control and moderate them.

4. Supplier/Partner Relationships

It's vital for suppliers and partners to create, understand, and follow mutually agreed-upon standards to understand current performance and opportunities for improvement better. When a supplier and partner have different communication measures, it leads to an insufficient supply chain and wasted time.

5. Government and Environmental Regulations

Carriers face significant compliance regulations imposed by federal, state, and local authorities. As well as federal laws, environmental issues such as the anti-idling and other emission reduction regulations created by state and local governments have created concern that the compliance costs could exceed their benefits.

With the landscape of business operations continuously changing, there is a shift in the following challenges. Therefore, staying up to date with these changes and taking preemptive measures to ward off challenges is a sign of successful logistics management.

2.4 Gaining Competitive Advantage through Logistics Management

Q8. How Competitive Advantage gained through logistics management.

Ans : **(Imp.)**

Meaning

- Competitive advantage cannot be understood by looking at a firm as a whole. It stems from the many discrete activities a firm performs in designing, producing, marketing, delivering, and supporting its product. Each of these activities can contribute to a firm's relative cost position and create a basis for differentiation.
- A cost advantage, e.g., may stem from such disparate sources as a low-cost physical distribution system, a highly efficient assembly process, or superior salesforce utilization.
- Differentiation can stem from similarly diverse factors, including the procurement of high quality raw materials, a responsive order entry system, or a superior product design.
- A systematic way of examining all the activities a firm performs and how they interact is necessary for analyzing the sources of competitive advantage. Michael Porter of Havard has proposed the value chain as the basic tool for doing so as shown in Fig.
- The value chain disaggregates a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential sources of differentiation.
- A firm gains competitive advantage by performing these strategically important activities more cheaply or better than its competitors.

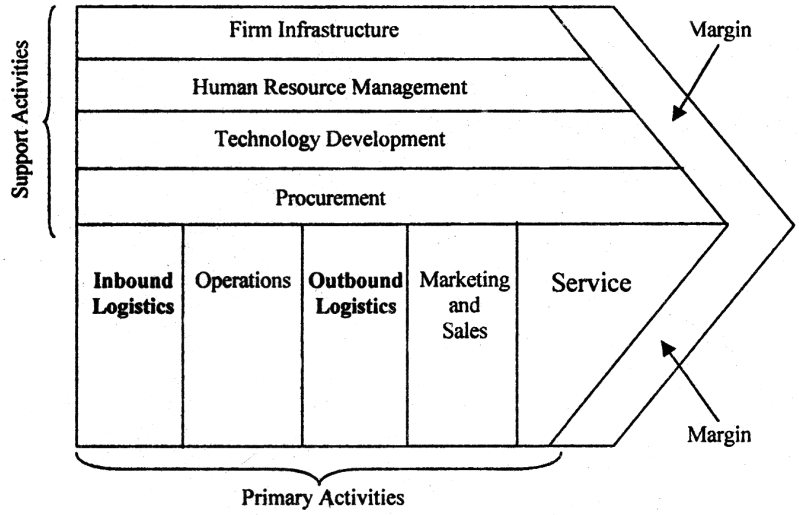


Fig.: Michael Porter's Concept of Competitive Advantage through Value Chain

According to Porter, there are two types of activities can be found in the concept of value chain:

1. **Primary Activities:** These activities are as follows:

   i) Inbound Logistics involve relationships with suppliers and include all the activities required to receive, store and dissemi-nate inputs.

   ii) Operations are all the activities required to transform inputs into outputs (products and services),

   iii) Outbound Logistics include all the activities required to collect, store, and distribute the output,

   iv) Marketing and Sales activities inform buyers about products and services, induces buyers to purchase them and facilitate their purchase.

   v) Service includes all the activities required to keep the product or service working effectively for the buyer after it is sold and delivered,

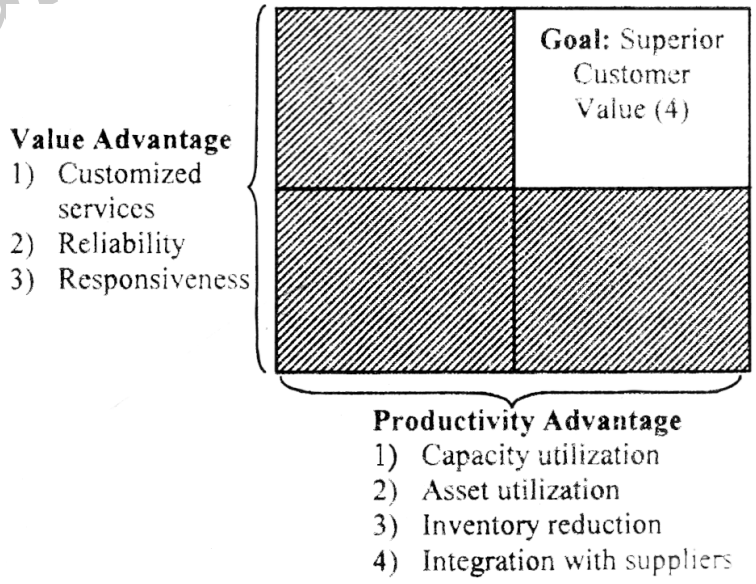


Fig.: Factors Affecting Value and Productivity Advantages

2. **Secondary Activities :** These activities are as follows:

   i) Procurement is the acquisition of inputs, or resources, for the firm.

   ii) Human resource management consists of all activities involved in recruiting, hiring, training, developing, compensating and (if necessary) dismissing or laying-off personnel,

   iii) Technological development pertains to the equipment, hardware, software, procedures and technical knowledge brought to bear in the firm's transformation of inputs into outputs.

   iv) Infrastructure serves the company's needs and ties its various parts together, it consists of functions or departments such as accounting, legal, finance, planning, public affairs, government relations, quality' assurance and general management.

Thus, the future leaders will be those who have sought and achieved the twin peaks of excellence, i.e., cost leadership, and service leadership. By performing these activities more efficiently than its competitors or in a unique manner the companies can create differentiation.

It can also be summarized that the companies who are keen on achieving competitive advantage by integrating both value and productively advantage should take care of the factors affecting these two advantages as shown inilgure.

2.5 TRANSPORTATION

Q9. What is meant by Transportation?

Ans :

Introduction

The transportation activity moves products to markets that are geographically disparate and provides added value to the customers when the products arrive on time, undamaged, and in quantities required. The utility provided by the transportation function is called place utility, while the utility crated by the storage function is called time utility'. However, without transportation function, the delivery of time utility will not be completed since transportation function decides how fast and how consistently a product moves from one point to another.

The importance of transportation in physical distribution emanates from a variety of factors. Transportation confers 'time and place utility' to the product; it determines the company's customer service; it also has a crucial bearing on the other elements of physical distribution and marketing, like warehousing, inventory control and channel management. Finally, transportation is also a very' important cost element in most businesses.

Basically, transportation management involved decision on:

- How much to move?
- When to move?
- Where to move?
- By what mode, or combination of modes to move?

The consideration in making these decisions are:

- The lead time for stock replenishment
- Sales expected in the territory in the intervening time.
- The normal cycles of inventory build up at the warehouse/dealer points.

If a firm can estimate these factors fairly accurately, it can make the basic decisions on transportation. In a rundamental sense, transportation has to be based on the sales forecast. Decisions on, when to move, how much to move and where to move will essentially depend on the sales forecast.

Q10. Who are the different Participants in transportation.

Ans : **(Imp.)**

Participants that are involved in transportation include:

(a) Shipper

Shipper is entitled to transfer goods from the origin to destination at minimum possible cost within the stipulated time period. Its services include minimum delivery time, reduced losses and damages to the products and so on.

(b) Consignee

Consigneer is the receiving party of the objects from the shipper.

(c) Carrier

Carrier is the medium through which a shipper can transport the goods to the consignee. Carrier aims at minimizing the cost of transportation thereby maximizing the profits of the suppliers.

(d) Government

Government formulates various regulatory and prmotionary programs for improving the transportation activities as they have a considerable effect on economic growth of nation. The objective of government is to expedite the shipment of goods at reasonable cost.

(e) Public

The diversified need for transportation across the countries is mainly determined by the public demand for goods at low price. Most of the transportation decisions have to be made by considering the public expectations.

It is necessary to maintain harmonious relationships among the various participants for information sharing as proper information flow in addition to material flow is also very important for the effective management of transportation.

Q11. Explain the various modes of transportation in SCM.

Ans : **(Imp.)**

Following are the five basic modes of transportation:

(i) Railways

Railways are primary long-distance, large volume movers that are usually engaged in transferring low value, high density goods. A major advantage of this mode lies in its ability to transfer a bulk of goods (large volume of goods) at considerably low cost than transferred by any other modes of transportation.

Advantages of Railways

1. It helps in achieving economies of scale where average production cost can be reduced by producing bulk quantities of outputs such that per unit cost can be lowered by spreading fixed cost over large volume of output.
2. It is capable of transferring large volume of high density goods.
3. Among other modes of transportation, it is found to be associated with lowest cost per ton-mile.

Disadvantages of Railways

1. It is a costly process if the distance between the manufacturer and supplier increases.
2. It is characterized by low accessibility. 'Accessibility' is a term generally used to describe the ability of a carrier to provide service to and from the source to the destination.

(ii) Roadways

They constitutes the most common means of transportation. Motor carriers are capable of operating under all types of infrastructures, they can be operated by a publicly maintained highways by exercising small investments in these assets. They are suitable and are the most favourable method for handling small shipment orders.

Advantages of Roadways

1. It is one of the simplest methods used by logisticians for the transfer of goods.
2. Its cost structure is characterized by low fixed cost and high variable cost.
3. Infrastructure and financial facilities are provided by government through tax charges and licensing fees.

Disadvantages of Roadways

1. It is a costly affair as it involves a series of small carriers for the movement of goods.
2. Huge amount of capital is required to establish the motor carrier industry.

(iii) Airways

It is found to be the newest and recently utilized mode of transportation. This is mainly used for the delivery of fragile and non-bulky/light weighted goods from the distant suppliers. Even the delivery of highly demandable scarce products find its ways in air freighting.

Advantages of Airways

1. Its major advantage lies in its ability to transfer goods in a very short span of time (speed delivery).
2. Its fixed cost is relatively lower than other modes while its variable cost increases due to the excessive usage of fuel, labour efficiencies etc.

Disadvantages of Airways

1. It is expensive.
2. It has to suffer from customs and excise regulations.
3. Reliability is less.
4. It is not suitable for. transporting heavy and bulky goods.

(iv) Waterways

If the movement of goods takes place through lakes, canals and navigable rivers, it is said to have been transferred through waterways. It is the oldest mode of transportation. It is primarily used to transfer low value and high density goods that can be easily loaded or unloaded. Usually minerals, agricultural and forest products can be transferred with the help of such waterways.

Advantages of Waterways

1. Its main advantage lies in its ability to move large shipments.
2. It is an economic mode of transportation for bulky and heavy goods.

Disadvantages of Waterways

1. It involves extended transit times and low accessibility.
2. It is usually affected by adverse weather conditions.
3. As it is a slow moving transportation mode, perishable goods cannot be moved by this mode.

(v) Pipelines

Pipelines is the most economical and convenient mode of transportation required for the transfer of water, petroleum and natural gas. It is the only mode which is operating on '24 x 7' basis. It is associated with high fixed cost while its operating costs is found to be lower than other modes.

Advantages of Pipelines

1. Low cost of operations.
2. Usually remains unaffected by weather conditions.

Disadvantages of Pipelines

1. It requires large amount of initial investment for maintaining and installing the pipelines.
2. Its accessibility is restricted to only those shippers that are located adjacent to the pipelines.

2.5.1 Functions

Q12. Explain various functions of transportation.

Ans : **(Imp.)**

Transportation Provides two Basic Functions:

1. **Product Movement:** It is a primary transportation function. It moves the product up and down the value chain. Whether the product is in the form of materials, components, assemblies, work-in-progress or finished goods, transportation is necessary to move it to the next stage of the manufacturing process or physically closer to the ultimate customer.

   However, during transportation of the product, there could be some loss on account

of damage or product loss. Also, the product is inaccessible for use when it is in transit. There could also be environmental hoards due to use of polluting fuels. Hence, for a transportation decision-making, the costs of the temporal, financial and environmental resources have to be considered.

2. **Product Storage:** A less common function is that of temporary storage though vehicles make rather expensive storage facilities. In-transit storage requires to be moved again shortly, e.g., in a few days.

   Temporary storage becomes advantageous as the cost of unloading and reloading the product in a warehouse may exceed the daily charge of storage in transportation vehicles. Where the warehouse space is limited, utilizing transportation vehicles may become a viable option. There are two different options:

   i) Sometimes the product is loaded on the vehicle and then the driver is instructed to take a circuitous or indirect route to its destination, as the transit time is greater than with the direct route.

      This happens in cases where the origin or destination warehouse has limited storage capacity. Thus, the transportation vehicle is used as a temporary storage option where the inventory is moving instead of sitting idle.

   ii) At other times, temporary storage is achieved through diversion. This occurs when an original shipment destination is changed while the inventory is in transit. For example, suppose a product is initially scheduled to be shipped from Mumbai to Hyderabad. But during the delivery process it is determined that Visakhapatnam (Vizag) warehouse is in greater need of product or has storage capacity. Thus, the product could be diverted to the alternative destination of Vizag.

      Traditionally, the telephone was used to direct diversion strategies but nowadays satellite communication between enterprise headquarters and vehicles handle such tasks more efficiently.

2.5.2 Costs

Q13. What are the factors affecting transportation cost?

Ans : **(Imp.)**

Transportation costs are affected by a variety of factors. These factors can be divided into product-related factors and market-related factors.

The product related factors include:

1. **Density of the Product:** The weight to volume ratio or density has a major part to play in deciding the transportation costs. Products which are heavy will usually require costlier transportation alternatives.

2. **Stow Ability:** Stow ability refers to the extent to which a product can fill in the available area.

   For example, liquids like petroleum or food grains can completely fill the volume of the area available while machinery or automobiles will not fill the area to that extent. Products with greater stow ability will thus require relatively less transportation space.

3. **Ease or Difficulty in Handling:** Ease or difficulty in handling is also associated with stow ability. Products that are uniform in their physical characteristics or that can be manipulated with material handling equipment require less handling expenses and are therefore less costly to transport.

4. **Liability:** Often products which have high value to weight, like electronic gadgets, crockery, etc., are easily damaged and cost more for transport.

Some of the market-related factors that affect transportation costs are:

1. Degree of inter-mode or intra-mode competition,
2. Location of the markets,
3. Balance or imbalance of infight traffic in and out of the market,
4. Seasonabilily of the product movements, etc.

2.5.3 Mode of Transportation Network and Decision

Q14. Explain various Mode of Transportation Network and Decision.

Ans : **(Imp.)**

Transportation, the movement of products from the place they are made to where they are used, is the most -expensive physical challenge. Because product availability and timely deliveries depend on transportations, transportation decisions directly affect customer service. A company's distribution and marketing strategy around a unique system can ensure on-time deliveries and thereby give the firm a competitive advantage. Companies may build their own transportation fleets or contract carrier. The major decision areas in transportation are as follows:

i) Transportation mode selection,

ii) Vehicle routing and scheduling, and

iii) Freight / Shipment consolidation.

i) Transportation Mode Selection

Distribution managers select a transportation mode based on the combination of cost, speed, dependability, load flexibility, accessibility, and frequency that is most appropriate for their products and generates the desired level of customer service:

1. **Cost:** Marketers compare alternative transportation modes to determine whether benefits from a more expensive mode are worth higher costs.
2. **Speed:** It is measured by the total time a carrier has possession of goods, including the time required for pick-up and delivery, handling, and movement between points of origin and destination. Speed obviously affects a marketer's ability to provide service, but other, less obvious implications are important as well.
3. **Dependability:** Dependability of a transportation mode is determined by the product provided. Marketers must be able to count on carriers to deliver in an acceptable condition.
4. **Load Flexibility:** It is the degree to which a transportation mode can be used for appropriate equipment and conditions for moving specific kinds of goods, which provided for moving other products. Many products must be shipped under appropriate temperature and humidity.
5. **Accessibility:** It refers to a carrier's ability to move goods over a particular time period of work.
6. **Frequency:** It refers to how often a company can send appropriate transportation mode.

ii) Vehicle Routing and Scheduling

- While one of the major objectives of logistics is to reduce the inventory storage time, the transportation efficiency also plays a major part in achieving this objective.
- While indirectly the transportation time and dependability will affect the tendency to carry inventory by distributors and stockiests, directly, the in-transit inventory has to be pruned so that the inventory storage time can be reduced.
- The vehicle routing problem is related to this aspect. It tries to find-out the best path a vehicle should travel through a network of roads, rail lines, shipping lines, etc., so that the time and distance traveled is minimized to the maximum.
- The methods of routing a vehicle through a network has been solved by methods designed specifically for it. Most of these methods are highly analytical in nature and require powerful computers to solve practical problems. Some of these methods are the shortest route method, which tries to work-out the best route from a single origin through an iterative solution methodology, the transportation method where problems with multiple origin and destination points are solved, etc.
- Vehicle scheduling problems are extensions of vehicle routing problems. In vehicle scheduling, more realistic restrictions are included like restrictions on the number of stops on the route where goods have to be picked-up/or delivered, the use of multiple vehicles with different capacity limitations of both weight and volume, restrictions on maximum driving time, etc.

iii) Freight Consolidation

Freight consolidation activity is mainly intended to reduce the cost of transportation through bringing together smaller quantities of inventory in order to create a bigger quantity for transportation. This principle ensures the optimum sharing of fixed costs of transportation. Consolidation is achieved by:

1. Consolidating the inventories which involves grouping different items together so that these items are transported together and not one or a few items together.
2. Vehicle consolidation where vehicles with less than truckload inventory are not allowed and consolidation of inventory into full truckload is preferred.
3. Warehouse consolidation where warehouses are located in such a way that large quantities of inventory are transported through large distances and smaller quantities are transported through smaller distances.
4. Temporal consolidation where orders from the downstream are held so that larger orders are accumulated for transportation.

The consolidator activity often leads to reduction in service levels as time utility is traded-off for reduced transportation cost.

2.6 CONTAINERIZATION

Q15. What is Containerization? Explain various benefits of Containerization.

Ans :

Meaning

A container essentially can be called as equipment utilized to carry goods or store goods. Based upon this concept of a container, we can say that containerization is technique or a method of distributing goods in unitized form thereby making it convenient to evolve or establish an intermodal transport system which can be a combination of railways, roadways, waterways or airways. Containers are usually standard sized and are referred to 20 ft. containers, 40 ft. containers etc.

The international organization has defined freight container as and article of transport equipment of a permanent character and accordingly strong enough for repeated use specially designed to facilitate the carriage of goods by one or more modes of transport without intermediate reloading fitted with devices permitting its ready handling so designed as to be easy to fill and empty.

Benefits

- It eliminates the need for intermediate handling.
- The absence of intermediate handling as well as the goods being transported quickly indicates that there are few chances for a cargo to get damaged or pilfered.
- Since there is less risk of damage and pilferage due to containerization, transporting companies can charge profitable cargo carrying premiums. Such premiums cannot be changed in the conventional mode of cargo shipment.
- Since the need for intermediate handling at terminal points such as ports, is avoided, savings on labour can be realized.
- Since goods are transport in standardized containers, saving on packaging materials, labour required for packing, etc can be realized.
- There is improvement in total quality service.

Q16. Explain various types of Containerization.

Ans :

1. **General Cargo Container:** This container is packed with all general type of cargo that does not require any specific temperature control. Today most of the containers that are in use are overwhelmingly the general cargo type.
2. **Thermal Container:** These containers are specifically designed to carry cargo that requires refrigeration or thermal insulation. It is covered with a special material that has low heat transfer such as polystyrene foam. Thermal containers are further classified in to three types

Refrigerated containers meant for food items that require cold storage facility. E.g. meat, fish etc.

Insulated containers for fruit, vegetables etc. Here dry ice is used as cooling medium.

Ventilated containers which allow the passage and circulation of air through openings made either on the sides of the containers or at the ends of the containers. E.g. coffee seeds, tea leaves etc. are carried in these containers.

3. **Dry Cargo Containers:** These containers are in maximum use. Such containers are very useful when cargo has to be stuffed in to the container after the container has been mounted on to a wagon or a trailer.
4. **Flat Container:** These containers have only a strong base and no side walls. They are useful when the cargo is of odd size or when the cargo is very heavy. Trucks which carry heavy machinery, large sized pipes or railway wagons which carry army tanks make use of such containers. These containers are also called flat rack.
5. **Bulk Containers:** Are basically large sized containers, which have man holes in them. Man holes are openings or holes at the top of the container similar to what we see in petrol or water tankers. Such man holes facilitate the loading of bulk cargo using gravity.
6. **Garment Containers:** These containers have hangers built in them. Clothes can be hung from the hangers instead of folding and packing them in boxes. Such containers are thus used for transport of garments only.
7. **Liquid Containers:** These containers are usually made of stainless steel, They have manholes built in them. These manholes are very useful to load or unload liquid cargo. Wd Dan see such containers in the transportation of milk.
8. **Gas Containers:** These are specialized containers that have fixture fittings which help to fill or empty liquefied gas. E.g. Liquid oxygen. They have thick walls and are made of high quality stainless steel. This is required for safe transport of liquid gas.

2.7 Cross Docking

Q17. What is Cross Docking? Explain evolution of Cross Docking.

Ans :

Meaning

Cross docking is a shipping method that transfers goods from one transportation mode to another to get them directly from the source to their destination. Cross docking is widely used in freight transportation because it helps reduce costs and storage space, among other benefits.

Cross docking involves transferring cargo or goods directly from the inbound transportation mode to the outbound one. Cross docking takes place in a distribution dock terminal where transport vehicles have dock doors on the sides and minimal storage space.

Cross docking aims to reduce costs associated with transportation, warehousing, and storage. Cross docking also reduces the time spent transporting products by eliminating unnecessary steps such as unloading and storing items in a warehouse facility.

Cross docking is especially useful for high-volume products and perishable goods that must be shipped immediately. The process of cross docking has benefits for retailers, suppliers, and consumers.

- Retailers benefit from increased efficiency, productivity, and lower inventory costs.
- Suppliers benefit from the reduced time between receiving an order and shipping the product out, resulting in increased revenue and profit margins.
- Consumers benefit because they receive products faster than they would have if they were shipped using traditional distribution methods.

Evolution

Back in the 1930s, the U.S. trucking industry improved cross docking processes and operations. During that time, companies were looking for ways to increase the effectiveness of their supply chain management systems, speed the delivery of goods to consumers, and lower the cost of carrying inventory.

The implementation of the cross docking method continued in the United States into the 1950s, improving supply chains particularly in the retail sector. And in the 1980s, one of the world's largest qqretailers, Walmart, introduced a cross docking system that created a significant competitive advantage.

Today, companies are still looking for ways to improve the speed and efficiency of delivering goods to customers while keeping costs as low as possible. But the difference between the early days of cross docking and today's cross docking is that modern logistics technology can help companies ensure that goods are not lost or misplaced during the cross docking process.

Q18. Explain various types of Cross Docking.

Ans :

Types of Cross Docking

Cross docking is an effective method that can optimize supply chain operations and increase efficiency. However, it's essential to know the differences between the types of cross docking so you can decide which one is best for your business.

1. Pre-distribution Cross Docking

Pre-distribution is the most basic type of cross docking. It processes the receiving, unloading, sorting, and repackaging of items based on a pre-established distribution instruction. When using pre-distribution cross docking, inventory items stay at the cross docking warehouse only briefly.

Pre-distribution cross docking, the customer's information is provided to the warehouse staff even before the supplier ships the products. This cross docking type suits retailers who run their own warehouses and have complete control over all their interactions with customers and suppliers.

2. Post-Distribution Cross Docking

Post-distribution cross docking is a process that involves arranging and keeping items in the docking facility for a short period or until the customers are determined. It enables sellers to make more knowledgeable decisions concerning shipping, inventory, sales forecasts, and trends so they can distribute goods more effectively.

Post-distribution cross docking is well suited for distributors and retailers who carefully plan where to ship their merchandise based on various factors such as seasonality, weather conditions, and consumer preferences.

Q19. Explain various methods of Cross Docking.

Ans :

Cross docking can be applied across all modes of transportation, including air freight, trucking, rail, and waterborne shipping. It is accomplished using three essential methods.

i) Continuous Corss Docking

Continuous cross docking is a method of cross docking where goods move in a constant flow between the receiving and shipping areas. This minimizes waiting times between the unloading and loading of cargo, which results in more efficient use of time and space at the terminal.

In this method, multiple trucks drive up to a set of doors at one side of the distribution center, unload their cargo, then reload onto another truck on the other side. Terminals will have many trucks lined up in this fashion, one after another, ready to be loaded or unloaded as needed.

ii) Consolidation arrangements

The consolidation arrangement method combines multiple small shipments before transportation. The items are temporarily kept in a terminal warehouse until they are shipped out of the facility in full truckloads.

Consolidation arrangements are made so that more space is available for storage. They also increase efficiency as cross docking facilities need to handle fewer shipments. Consolidation arrangements also reduce the number of shipments, which can increase customer satisfaction through lower freight costs associated with each shipment.

iii) De-consolidation

De-consolidation is a method of dividing large shipments into smaller batches. It is frequently applied in fulfillment for direct-to-consumer sales, where goods are delivered to customers' homes or business locations.

With de-consolidation, businesses reduce transfer, handling, and transportation costs while customers receive their orders much more quickly. Companies employing this strategy must be sure they have sufficient compliance, auditability, and traceability.

Q20. Explain the advantages and disadvantages of Cross Docking.

Ans : **(Imp.)**

Advantages

Cross docking is an excellent way for businesses to streamline operations and ship products quickly. The following are the advantages of using the cross docking method.

i) Faster Shipping and Receiving

Cross docking is an excellent option for companies that ship their products to their final locations. With cross docking, products can be stored with less or no labor, which speeds delivery to the final location.

As larger volumes of products are divided into smaller shipments and loaded onto trucks traveling in the same direction, shipping efficiency also rises. This makes it easier for manufacturers and distributors to keep up with customer demand for faster delivery times.

ii) Increase Cost Savings

Cross docking can help save money in many ways. For example, eliminating the need to store finished goods significantly reduces storage costs. Reducing the number of steps in the production process also cuts labor costs and transportation expenses for finished goods.

Additionally, cross docking helps keep inventory levels low; this reduces purchasing and carrying costs.

iii) Reduced Time

Cross docking aims to improve supply chain efficiency by reducing the time it takes for products to move from one stage of production or distribution to another. It allows businesses to spend less time managing their inventory while maintaining proper stock levels between locations.

The ability to ship products quickly and efficiently is crucial for businesses with high-volume sales. Cross docking helps keep everything moving on schedule, so customers know they can count on getting their orders quickly.

iv) Central Location for Product Handling

Cross docking can help centralize product handling in one location. This means that fewer people handle the product, and there's less chance for human error.

Having last-mile distribution occur from one central location also optimizes the supply chain. This helps reduce travel time and costs associated with moving products and decreases the amount of space needed at each facility or warehouse location.

v) Minimal Material Handling

One of the main advantages of cross docking is that it eliminates the need for multiple transfers. As a result, there is less inventory handling and less risk of damage. In addition, storage requirements are reduced because inventory is maintained at lower levels.

Goods with a shorter shelf life or those that benefit from end users acquiring them sooner can be moved into reverse flow transportation networks more quickly than traditional processes allow.

Disadvantages

The following are some disadvantages that cross docking may bring to a business.

i) Fewer Suppliers

As with many supply chain operations, cross docking is a highly automated process. This means that it requires less human labor to operate than other inventory management methods, making it cheaper for a company to maintain.

However, this also means that fewer suppliers are needed. Some companies have only one supplier for their cross docking operation, meaning they don't have any choice regarding which products they can carry and how much they cost.

ii) Supply Chain Vulnerability

The most apparent disadvantage is vulnerability to supply chain disruption. Supply chains become much more vulnerable to disruption with less inventory and shorter lead times.

The longer lead times associated with traditional warehousing are also advantageous because they allow companies to plan for disruptions and set up contingency plans if needed. With cross docking, however, there isn't as much time for contingency planning because everything happens quickly.

iii) Reduced Storage Availability

Another disadvantage of cross docking is the loss of control over inventory. This may mean that products are stored in areas where they are not customarily kept or outdoors on pallets. There is not as much time to keep track of this inventory because it comes and goes quickly.

As a result, there is less control over product quality, availability, and safety compared to traditional warehouses, where shipments are stored for longer periods before being loaded onto trucks or trains.

iv) Handling Complexity

Cross docking is more complex than traditional warehousing, so it carries more risk of error. The extra steps involved in cross docking, including communicating with other warehouses and coordinating their operations, can complicate the process.

This complexity directly impacts costs as well; a company may need to hire additional staff or invest in new software to handle the extra work involved in cross docking operations.

2.8 REVERSE LOGISTICS

Q21. What do you mean by reverse logistics? State its need and benefits.

Ans : **(Imp.)**

Definition

According to Rogers and Tibben-lembke, reverse logistics is a process of planning, implementing and controlling the efficient cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or for proper disposal.

Reverse logistics is gaining a wide scope in a present scenario due to the endless generation of waste material, whose recycling and reproducing plays a major role in increasing the profitability of a firm. Today, most of the firms are engaging themselves in reverse logistics activities. The management of reverse supply chain is a difficult task as it is mainly influenced by the planning and forecasting methods. Hence, firm must maintain proper schedules for both planning and forecasting for future products and ' requirements of the firm.

In India, well organized reverse logistics are practiced by majority of the firms/industries.

Example

Paper industry has established a well organized collection modes for collecting used paper whose recycling produces fresh paper which in turn reduces the additional usage of wood [which is acting as a raw material in paper industry]. Reverse logistics is a "green concept" where organizations are emphasizing more on improving the social and environmental conditions of customers rather than just striving for profits. Thus Environment Friendly Supply Chain (EFSC), which enables the firms to achieve the position of a "responsible corporate citizen" needs to be designed.

Need

As reverse logistics mainly deals with all the operations related with the recycling or remanufacturing of products and materials, it can also be termed as "Product Recovery Management" (PRM).

Reverse logistics considers the following aspects,

1. Determination of alternatives for the recovery of products and component parts.
2. Decisions related to the selection of persons who are responsible for performing all these reverse logistics activities.
3. Finds out the ways with which these activities can be performed.
4. Integrating the activities of reverse logistics with classical production and distribution systems.

Benefits

'Reverse logistics are not simply a matter of driving the truck on the opposite way". However, it is associated with both benefits as well as challenges. The following are the important benefits of reverse logistics,

(i) It helps in reducing the operating cost as the used/ returned products become the input of production/ remanufacturing process.

(ii) It increases the efficiency of operations.

(iii) Reverse logistics plays an important role in improving the environment and making it "clean and green" by efficiently utilizing the used/waste products.

Q22. Describe the process of reverse logistics.

Ans :

Mainly the process of reverse logistics initiates at warehouses which includes the following activities,

1. Returns Management

This stage is mainly responsible for the effective management of used/waste products. It must ensure that a proper storage facility is provided for stocking used/waste products. It channelises the collection and storage of recalled products.

2. Remanufacturing Facility

At this stage, stocks of returned products are subjected to production processing which improves the performance of returned products. This remanufactured products increase corporate profitability by enhancing sales through price discount offerings.

3. Remarketing

In this stage, remarketers make use of coordination and reverse flow strategies for positioning and resale of these products when such products are not required by the original users. The Defense Logistics Agency (DLA) has established a comprehensive remarketing process by which used equipments can be transferred to other military services.

4. Recycling

Recycling is associated with the disbursement of returned products into their component parts such that they can be reused in more efficient manner than they would have been used previously. When they cannot be reused effectively, they need to get disposedoff in the appropriate landfills (which also comes under reverse logistics).

5. Disposal

If the returned products cannot be recycled or remanufactured then they have to be disposed in the appropriate landfills depending on the nature of the products.

Q23. Explain the differences between forward and reverse logistics.

Ans :

Sl. No.	Forward Logistics	Sl. No.	Reverse Logistics
1.	Forward logistics refer to a process of planning, implementing and controlling the efficient flow of raw materials, component parts, finished goods and information, from the point of origin to the point of final consumption for the purpose of achieving customer satisfaction.	1.	Whereas, in case of reverse logistics, raw materials, in-process inventories, finished products and information flows from the point of consumption to the point origin for the purpose of recapturing value or for their proper disposal.
2.	Demand can be forecasted by adopting suitable forecasting techniques.	2.	Demand forecasting is a difficult task.
3.	Quality of a product is uniform.	3.	Quality of a product is variable.
4.	Distribution centers may vary from one to many.	4.	Distribution centres may vary from many to one.
5.	Pricing is found to be a relatively uniform measure.	5.	Pricing depends on various factors that influences the price of the products.
6.	Distribution cost is less and is visible.	6.	Distribution cost is more and cannot be determined clearly.
7.	Process feasibility is more.	7.	Process feasibility is less.
8.	Its product life cycle consists of introduction, growth, maturity, saturation and decline stage.	8.	In reverse logistics, returned products have to be passed through recovery, remanufacturing, remarketing, recycling and disposal stages.
9.	Products can be marketed by adopting efficient strategies.	9.	Product marketing is a difficult process as it does not have standardized marketing strategies.
10.	Inventory management is consistent.	10.	Inventory management is inconsistent and variable depending on the nature of returned products.

Q24. Explain the role played by reverse logistics in creating value in SCM.

Ans : **(Imp.)**

Role of reverse logistics in SCM can be understood from the following points,

i) Managing Reverse Flows

Several key activities or issues need to be considered while managing reverse flows in an efficient and effective manner. It has both pros and cons, as its proper management can improve firms financial position, while its mis-management brings heavy losses to a firm. Hence, proper care must be taken for its management which involves the following considerations,

1. Avoidance

Reverse flows can be avoided by delivering quality products at the initial stages of production by following efficient processes that minimizes returns.

2. Gatekeeping

By keenly checking and screening merchandise at each stage of reverse logistics enables the firm to eliminate unnecessary returns.

3. Minimizing Reverse Lead Times

Adoption of those processes which can reduce the cycle times for returns so that they can capture value at considerably low times.

4. Information Systems

Suitable and updated information systems play an important role in improving product feasibility, uncertainty and economies of scale.

5. Facility Layouts

Firms must ensure that return centres are located optimally at various locations so as to facilitate the smooth flow of reverse logistics operations.

6. Pricing

Fixing the best price to the returned or resold products help in generating huge revenues for the firm.

7. Outsourcing

By outsourcing various functions, firms can gain increased efficiency and can reduce operating cost which it has to incur while carrying out in-built activities.

8. Zero Returns

Firms can improve customer expectations either by providing returns allowance or by destroying them when they are unable to fulfill their expectations.

9. Recovery of Assets

Classifying the returned items such that surplus, scrap or obsolete items can be discarded while only recyclable products reach the reverse logistics process. Thus, by following the above prerequisites, reverse flows can be managed profitably and efficiently.

ii) Achievement of Value Through Reverse Logistics

- The most important challenge that every reverse logistics firm is facing is, to enhance profitability and to reduce cost by recapturing value by returned goods.
- It is a fact that remanufacturing or refurbishing of products is much more costlier affair for a firm than to produce new products.
- This increased cost is due to additional cost contributors, one such being a transportation cost which accounts for about 25% of the total cost or more than that.
- The estimation of the total cost associated with the reverse flows is the most difficult task. Some firms depend on the historical averages while others make use of ABC (Activity Based Costing) method for the estimation of budgeted cost.
- Firms should ensure that they have considered all costs associated with reverse flows irrespective of the method used for their estimation.
- Various costs include inventory cost, storage cost, transportation cost, handling cost, labour cost, packaging cost and other overhead costs. After estimating the total cost, firm must evaluate economic value of products through trade-off analysis.

After the evaluation of economic benefits of products, next step is to identify various external and internal factors acting as obstacles in the implementation of reverse logistics programmes. Some of them might be,

1. Less priority that has been given to the recycling process hinders its implementation.
2. Lack of proper attention of top management.
3. Absence of financial resources required for the operations.
4. Lack of skilled personnel for the development of reverse logistics programs.
5. Establishment of state, local or federal laws ascertaining to safeguard environment.

Hence, before initiating the reverse logistics process, every firm must give special emphasis to the above listed obstacles, so as to ensure the proper management of reverse logistics functions.

- By identifying the third party logistics company, various tactical and strategic issues can be resolved which helps in making reverse flows program a value stream rather than waste stream.
- Efficient management of reverse flows may not act as "core competency" of an organization but could be treated as a natural source for outsourcing. The following are the value added advantages provided by the 3PL provider.
  - i) Application of IT for maintaining inventory of products specially in case of a time-sensitive products. (Example, computers, cell phones, EDAs etc.,) which have reduced life cycles and high risk of obsolescence. 'The value of time' is a crucial factor that needs to be considered in a return process as they are time- sensitive, even a small time delay could be disastrous for firms.
  - ii) It reduces operating cost as it makes use of returned/ reused products.
  - iii) Increases the value of products by subjecting them to recycling or remanufacturing.
  - iv) Maintaining eco-friendly relationship with an environment by producing high quality goods which in turn reduces pollution or waste discharge into the environment.
  - v) Efficiency of the process can be obtained at low cost as 3PL provider is already found to be efficient in performing such activities.

Q25. How firms can derive a reverse logistics strategy? What are the drivers of reverse logistics?

Ans : **(Imp.)**

There is no specific reverse logistics strategy that can be applied to all the firms of an industry. However, it varies from one firm to ang.other. This variation occurs because of changes in the number, frequency and character of returned items which is highly specific for a particular industry.

Even, the balance of disposition options undergo a drastic change. This variation is due to the changes in the number of items that has to be repaired, refurbished, remanufactured and recycled. The following are some of the significant features seen in most successful reverse logistics strategies,

1. Even though all vendors of supply chain are providing the basic functionality of reverse logistics, they are not efficient in providing an effective module of reverse logistics. The best partners of supply chain are servicing the broad range of customers by offering flexible functionalities.
2. On line retail can evaluate the reverse logistics strategy in terms of transactions and capabilities of e-SCM (where e-commerce systems are used). Such transactions (or systems) need to be designed where sales turnover and customer service should be high, by keeping the operating expenditures at their lowest possible extent.
3. Logistics manager need to decide whether the elements of reverse logistics process have to be outsourced or to be insourced depending on the results of cost-benefit analysis. Such that at a technical level, he can outsource activities, such as installation, maintenance and day-to-day activities of reverse logistics, IT applications by undergoing an application service provider agreement, which reduces the firm burden of hiring new systems and hardwares.

Drivers of Reverse Logistics

Due to the substantial growth of reverse processes in most of the industries, firms need to understand the major drivers of reverse logistics operations which helps them in identifying both the challenges and opportunities.

In this context these forces have been identified, which are as follows,

1. Customer Returns

Customers return products, if they are unable to meet their requirements or if they are characterized by defects, warranty problems, recalls or mis-shipments. If these returned

products can be processed in an efficient manner then this would increase the revenue generating opportunities of the firm as they hold a substantial impact on firms profit and loss statement. By incorporating customer return issues as a key element of customer service policies, increased levels of customer satisfaction can be achieved.

2. Environmental Issues

Certain regulatory policies at state, local or federal level forces the firms to produce eco-friendly products, new standards and also their role in implementing several recycling programmes, constitutes their ethical role and corporate social responsibility. These policies are not only beneficial in improving the standard of living of people but also helps in improving the overall efficiency of an environment by maintaining effective relationships with suppliers so as to reduce cost, production times, pollution and to increase productivity.

3. Economic Value

Most of the business-oriented firms including the nonprofit organizations are deriving economic benefits form reverse logistics, i.e., recycling and remanufacturing of reused products can be practised for obtaining both profits and customer value. However, profitable management of reverse flows is both a challenge as well as an opportunity.

2.9 OUTSOURCING

2.9.1 Nature and Concept

Q26. What is Outsourcing? Explain the benefits of Outsourcing.

Ans : **(Imp.)**

Meaning

Outsourcing involves the contracting out of a business function - commonly one previously performed in-house - to an external provider. The two organisations may enter into a contractual agreement involving an exchange of services and payments.

For example, BMW outsourced with Boss Sound System in a way that Boss does all the music for the BMW cars. It is cheaper for BMW to make a deal with Boss sound system instead of opening a new factory to produce speakers and subwoofers. Boss is the in charge of doing sound systems in BMW.

The ability of businesses to outsource to suppliers outside the nation is referred to as off-shoring or offshore outsourcing.

Benefits

Outsourcing has the following benefits:

i) Cost savingsg.

Outsourcing lowers the overall cost of the service to the business, involving reducing the scope, defining quality levels, re-pricing, re-negotiation, and cost re-structuring. Labour arbitrage is the access to lower cost economies through off-shoring, which has generated by the wage gap between industrialised and developing nations.

ii) Focus on core business

Resources (for example, investment, people, and infrastructure) are focused on developing the core business. Organisations outsource their IT support to specialised IT services companies.

iii) Cost restructuring

Operations leverage is a measure that compares fixed costs to variable costs. Outsourcing changes the balance of this ratio by offering a move from fixed to variable cost and also by making variable costs more predictable.

iv) Improve quality

Contracting out the service with a new service level agreement achieves an improved quality.

v) Knowledge

Outsourcing helps to access to intellectual property and wider experience and knowledge.

vi) Contract

Services are provided to a legally binding contract with financial penalties.

vii) Operational expertise

Access to operational best practice that would be too difficult or time consuming to develop in-house.

viii) Access to talent

Access to a larger talent pool and a sustainable source of skills, particularly in science and engineering.

ix) Capacity management

Services and technology where the risk in providing the excess capacity is borne by the supplier needs capacity management.

x) Catalyst for change

Outsourcing can be used as a catalyst for major step change that cannot be achieved alone and the outsourcer becomes a change agent in the process.

xi) Enhance capacity for innovation

Companies increasingly use external knowledge service providers to supplement limited in-house capacity for product innovation.

xii) Reduce time to market

Outsourcing helps to accelerate the development or production of a product through the additional capability brought by the supplier.

xiii) Commodification

Outsourcing enables to buy the product at the right price.

xiv) Risk management

An outsourcer is better able to provide the mitigation of risks.

xv) Tax benefit

Countries offer tax incentives to move manufacturing operations to counter high corporate taxes within another country.

xvi) Scalability

The outsourced company is prepared to manage a temporary or permanent increase or decrease in production.

xvii) Creating leisure time

It optimises the work-leisure balance.

2.9.2 Strategic Decision to Outsourcing

Q27. Explain the various Strategic Decision to Outsourcing.

Ans :

1. Capacity Aggregation

Aggregating the demand across multiple firms and obtaining economies of scale is the mechanism by which third party can increase the supply chain surplus. Outsourcing is done when there is a growth in surplus and when the requirements of the firm are lower than the volumes needed to gain economies of scale. The third party does not prefer to increase the surplus through capacity aggregation when the firm's volume requirements are large and stable.

2. Inventory Aggregation

Supply chain surplus can be increased by aggregating inventories over several customers. Aggregation helps in improving economies of scale in purchasing and transporting the iqyentories and in reducing the uncertainties. Inventory aggregation improves the supply chain surplus when the customer's are fragmented and uncertain.

3. Transportation Aggregation by Transportation Intermediaries

Aggregation of a transportation function increases the supply chain surplus. The transpor-tation intermediary aggregates all the shipments across multiple shippers. This leads to reduction in cost of shipment.

4. Transportation Aggregation by Storage Intermediaries

Supply chain surplus can be increased by the third party by aggregating inbound and outbound transportation.

In case of inbound logistics, third party perform shipment aggregation from many manufacturers on to a single truck resulting in the lower transportation cost than it could be achieved by independent manufacturer. In case of outbound logistics, third party aggregates packages for customers at a common destination leading to the lower transportation cost than it could be achieved by each single customer. This is the most effective form of storage intermediary aggregation in which the intermediary keep the stock of goods from suppliers and serves it to the customers.

5. Warehousing Aggregation

Supply chain surplus can be increased by aggregating warehousing requirements across a large number of customers. Surplus growth is achieved in terms of lowered real estate costs and reduced processing costs. Warehousing aggregation tends to add much to the surplus for a small supplier or customer whose warehousing requirements are small and fluctuate over time. In case of large supplier or customer, warehousing aggregation cannot increase the surplus.

2.10 THIRD-PARTY LOGISTICS (3PL) AND FOURTH-PARTY LOGISTICS (4PL)

Q28. Define Third-party Logistics (3PL). What are the functions of 3PL's?

Ans :

Meaning

Third party logistics is an outsourcing concept wherein logistics and distribution functions are performed by the logistics service provider who can perform these activities much more efficiently than they are being performed by the manufacturing firm. Due to 3PL service, a manufacturing firm can focus more on their core competencies and manufacturing activities rather than on their marketing activities. The logistics and distribution activities constitute around 5% of the final cost of product which can be reduced further by outsourcing them to a 3PL provider.

Functions

The common 3PL functions are as follows:

1. **Warehouse Management:** The warehouse management function of the 3PL includes managing the warehouse and performing basic warehousing functions like receiving, storage, pick, pack and ship. It also takes care of safety and security of goods. For this, radio frequency scanning and bar code labelling of the product are also taken care of. Real times, periodic information about the movement of goods are also tracked to manage inventory. Additional services like cross docking, order fulfillment, return processing, and so on. are also taken care by 3PL providers.
2. **Transportation Management:** The transportation management function of 3PL includes fleet management for optimization of transportation cost and service improvement and network optimization to provide better services. It also takes care of load management, driver management and routing of the vehicles. Transportation management tasks also takes care of freight claim, cargo insurance, h eight bill payment and auditing. Integrating SMS with the WMS (Warehouse Management System) helps in providing integrated logistics solutions. Information like less-than-track load or multi-stop workload can help in serving customer better. For common destination, combination of freight from different vendors can help in economizing truck load and reduce overall cost. The transportation management function of 3 PL also tries to optimize ways to do it.
3. **Packaging:** The packaging function of 3PL takes care of final packaging of the product at the warehouse. The availability of this facility reduces the cycle time, product handling coast and hence reduces the total cost of the product. The customized packaging solutions like label and printing, display shippers, custom pallets, insert and coupons, repackaging or conversions, wrapping and bundling, etc. also help in optimizing the logistics operations.

4. **Information Management:** 3PL also provides information management solutions for various functions of logistics. Tools like Customer Management System (CRM) are used for providing real time visibility of the customer's shipment, invoice and other data. TMS or transport management system provides networking and routing solutions to the customer. Information technology based tools are also used for connecting a wide range of applications within the organization and provide cloud based services.

5. **Global services:** Services like multi-shipper container consolidation, custom and h eight forwarding, global air height and export documentation are few of the global services provided by 3 PL providers.

Q29. What is meant by Fourth-party Logistics (4PL)? State its components.

Ans : **(Imp.)**

Meaning

The term "fourth party logistics" was given by Accenture Consulting Group. "Accenture" defined 4PL in the following manner,

"A 4PL acts as an integrator that is responsible for assembling the capabilities, technology and resources of its own organization with other organizations to design, build and run comprehensive supply chain solutions".

A research was conducted by Accenture on customer satisfaction which revealed that the cost of products was not upto the expectations of customers, if they have been produced by a third party logistical firm. In order to surpass this effect, Accenture has introduced "fourth party logistics."

In order to become a fourth party logistics provider, a company needs to have extensive investing and maintaining skills, so that infrastructure and resources can be managed effectively, which in turn brings the efficient management of several 3PL service providers, required by the client organization.

Components of a 4PL

1. The Architect/Integrator

The 4PL makes use of innovative techniques with the help of which optimum utilization of 3PL service providers can be made as required by the client organization. The innovation process ensures a continuous and a steady change in the relationship of 3 PL provider and a client organization, so as to bring more benefits to the client organization.

2. The Control Room

The control room acts as the "brain and intelligence of the fourth party logistics". It is mainly involved in the process of decision making which comprises of experienced logisticians. These experienced logisticians with their collective knowledge improve the returns of the client organization.

3. Supply Chain Information

4PL consists of large number of resources and capabilities for collecting and spreading the information among different partner organizations. It also makes use of improved technologies like GPS, GIS so that the visibility of the goods can be increased. It is very important for a 4PL to have all the abilities so that it can combine the different or unrelated technologies of various 3PL and the client organization.

4. Resource Provider

The 4PL provider should provide certain resources which are very much essential for carrying out the critical functions of supply chain like warehousing, packaging etc.

Q30. What are the pros and cons of 3PL's?

(OR)

State the advantages and disadvantages of 3PLS?

Ans : **(Imp.)**

Advantages of 3PL

The various advantages to companies by using 3PL services are:

i) **Focus on Core Competencies:** The first and the most important advantage of 3PL is that it enables companies to focus on the core activities of the businesses. The focus on core activities is important as it creates value- added activities for making better revenue, hi this way. the businesses can remain focus on what they are good into and outsource the logistics activities. This will improve not only the quality of the product but also the quality of the service and hence will improve the overall peifonnance of the organization.

ii) **Better Funds Management:** Another advantage of 3PL is that it helps the organization manage their funds in better way. There are many organizations that do not have their own warehouse or transportation or packaging facility and because of the financial conditions of the company, they are not able to manage them. For all such organizations. 3PL can be a blessing. By outsourcing the logistics, they can reduce the inventory and hence can reduce the cost of the product. All these may help them in earning better revenue.

Those companies that are not short of fund, but want to spend that money on some core activity can do the same by outsourcing the logistics activities. Hence, it is beneficial both for the fluid cnuich and fluid sufficient businesses.

iii) **Enhanced Technological Capabilities:** Outsourcing logistics give the businesses the opportunities to use better technologies. 3PL organizations keep themselves updated with the latest tools and tecliniques available in the market. At the same time, the businesses have the opportunity to select the best 3PL partner. Hence, it improves the efficiency of the businesses and provides them the flexibility to select the technology of their choice without doing new investment.

iv) **Provide Flexibility:** Business environment is constantly changing and many times, this change has huge impact on the demand for the product. Using 3PL gives businesses the flexibility to change the scale of logistics without much effect on the core activities. The companies ar e guar ded against creating their own infrastructure and speed up the operations.

v) **Best Practices:** It enables businesses to adopt best practices and achieve best performance.

vi) **Green Logistics:** 3PL also takes care of the environment issues. The optimized distribution network, collaborations with business partners and ability to optimize the distribution network helps in reducing the carbon emission and also help in rationalizing the inventory to improve truck performance. All these help in achieving green logistics.

Disadvantages of 3PL

The various disadvantages of 3PL are as follows:

i) **Loss of Control:** Once outsourced, the businesses may feel that they have lost control over shipping activities. 3PL puts an important activity in the control of an outsider.

ii) **Loss of Connect with Clients:** Since 3PL partner is in contact with the client, the company may end up having right connection with the client, hi case the relationship between 3PL provider and the businesses become unsustainable, there is a risk of losing the market.

iii) **Communication Issue:** Lack of communication between businesses and 3PL provider is another disadvantage. If the businesses do not share complete information as they feel it may make them vulnerable, it creates communication gap and affects the relationship in the long-run.

iv) **Cost in Long-run:** 3 PL may turn out to be expensive in the long-run. It can happen in the case where the company has the expertise to run logistics in-house and is running it efficiently but moved to 3PL as it seems cheaper in short run.

Q31. Mention the differences between 3PL and transportation.

Ans : **(Imp.)**

Differences and Transportation Services

Sl.No.	Third Party Logistics (3PL)	Sl.No.	Transportation Services
i)	They understand their client's need.	i)	They have very littel or no understanding of the real business need of their client.
ii)	They command premium prices but are still competitive.	ii)	They only compete on the basis of price.
iii)	They combine technology, methodology, people, and so on, to plan the logistics need	iii)	They just work on the specification provided by the company.
iv)	They add value to the servicers through innovation.	iv)	Do not innovate anything on their own.
v)	Focus on efficiency and productivity.	v)	Focus only on cost.

Short Question and Answers

1. Objectives of logistics management.

Ans :

The following are the objectives of logistics management.

i) Improving Customer Service

The marketing concept assumes that profits maximization can be achieved in long run through maximizing the customer satisfaction. An efficient management of physical distribution can help in improving the level of customer service by developing an effective system of warehousing, quick and economic transportation, all maintaining optimum level of inventory.

ii) Rapid Response

It is concerned with a firm's ability to satisfy customer service requirements in a timely manner. Information technology has increased the capability to postpone logistical operations to the latest possible time and then accomplish rapid delivery of required inventory. The result is elimination of excessive inventories traditionally stocked in anticipation of customer requirements.

iii) Reduce Total Distribution Costs

Another most commonly stated objective is to minimize the cost of physical distribution of the products. The cost of physical distribution consists of various elements such as transportation, warehousing, and inventory maintenance and any reduction in the cost of one element may result in an increase in the cost of the other elements. Thus, the objective of the firm should be to reduce the total cost of distribution and not just the cost incurred on any one element. For this purpose, the total cost of alternative distribution systems should be analyzed and the one which has the minimum total distribution cost should be selected.

iv) Reliable and Consistent Delivery Performance

Timely delivery is crucial to the customer to keep up his production schedule; he is not interested in the delivery of material ahead of schedule. This area of operation is subject to variance. The other objective of logistics should be consistency in delivery performance; this will help in building customer confidence and contribute to creating long-term relationships.

2. Procurement /Purchasing

Ans :

Procurement is the process of buying goods and services for the user department based on order specifications given by that department. Procurement begins with sending the purchase order to the supplier. The procurement function involves various activities such as identifying new suppliers, qualifying the suppliers, negotiating terms and conditions of supply, organizing delivery of orders, arranging for insurance, finalizing the mode of payment, and sending the purchase order to the supplier. This function is considered to be a support function in logistics. It also involves monitoring the performance of the suppliers for adherence to quality standards as the quality of inputs in the form of parts supplied by the suppliers, affects the quality of the final product.

3. Warehousing

Ans :

Any firm can choose to either have its own dedicated network of warehouses or share space with others in third party operated warehouses. The former offers greater flexibility in design to meet product characteristics and storage needs, greater control over warehouse operations, effective market feedback and lower cost per unit as opposed to a third party arrangement. However, third party warehouses require no fixed investment by the firm. Also flexibility in location and space utilization make this an attractive alternative. Customer service can be improved significantly through this approach. These are also called distribution centers.

4. Material Handling

Ans :

Material handling is the area of physical distribution that has experienced the greatest change and improvement in efficiency. Two major changes took place in this area:

i) **Elimination of Man Handling:** The first improvement was the replacement of man handling by machine handling but still it is used in retail of final buyer stage. Improved conveyer systems and left equipments have changed to total mechanization.

ii) **Containerization:** The second impro-vement in material handling was containerization. It is a method by which a large number of units of a product are combined into a single compact unit for storage and transportation. It reduced material handling cost and time spent.

Material handling decisions and costs are also interrelated with other decisions and costs. Use of improved handling equipments and containerization will naturally increase the efficiency and reduce the wastage and costs. It also makes best utilization of space in storage, possibles.

5. Order-Sizing

Ans :

This is also a complicated problem in physical distribution decisions. Orders of less quantity (less than a container) will increase the cost of handling because the handling process will be done entirely by hand instead of machines. It will increase costs and consume more time. Less titan container size orders increase the costs of storage and inventoiy control and add to their complexity. It may also affect the cost of transportation because transportation charges will be lower for bulk quantity. Hence, management must make order size decisions concerning minimum order sizes, units in increment in order sizes, and preferred order sizes.

6. Transportation

Ans :

The transportation activity moves products to markets that are geographically disparate and provides added value to the customers when the products arrive on time, undamaged, and in quantities required. The utility provided by the transportation function is called place utility, while the utility crated by the storage function is called time utility'. However, without transportation function, the delivery of time utility will not be completed since transportation function decides how fast and how consistently a product moves from one point to another.

7. What is Containerization?

Ans :

A container essentially can be called as equipment utilized to carry goods or store goods. Based upon this concept of a container, we can say that containerization is technique or a method of distributing goods in unitized form thereby making it convenient to evolve or establish an intermodal transport system which can be a combination of railways, roadways, waterways or airways. Containers are usually standard sized and are referred to 20 ft. containers, 40 ft. containers etc.

The international organization has defined freight container as and article of transport equipment of a permanent character and accordingly strong enough for repeated use specially designed to facilitate the carriage of goods by one or more modes of transport without intermediate reloading fitted with devices permitting its ready handling so designed as to be easy to fill and empty.

8. Benefits of containerization

Ans :

- It eliminates the need for intermediate handling.
- The absence of intermediate handling as well as the goods being transported quickly indicates that there are few chances for a cargo to get damaged or pilfered.
- Since there is less risk of damage and pilferage due to containerization, transporting companies can charge profitable cargo carrying premiums. Such premiums cannot be changed in the conventional mode of cargo shipment.
- Since the need for intermediate handling at terminal points such as ports, is avoided, savings on labour can be realized.

9. What is Cross Docking?

Ans :

Cross docking is a shipping method that transfers goods from one transportation mode to another to get them directly from the source to their destination. Cross docking is widely used in freight transportation because it helps reduce costs and storage space, among other benefits.

Cross docking involves transferring cargo or goods directly from the inbound transportation mode to the outbound one. Cross docking takes place in a distribution dock terminal where transport vehicles have dock doors on the sides and minimal storage space.

10. Reverse logistics

Ans :

According to Rogers and Tibben-lembke, reverse logistics is a process of planning, implementing and controlling the efficient cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or for proper disposal.

Choose the Correct Answers

1. Which of the following is not a component of 4 PL? [b]
   (a) control room (b) resource providers
   (c) information (d) recycling
2. _____ includes design and administration of systems to control the flow of materials, WIP and finished inventory to support business unit strategy. [a]
   (a) Logistics Management (b) Materials Management
   (c) Bill of Materials (d) Distribution Management
3. _____ is the time that elapses between issuing replenishment order and receiving the material in stores. [b]
   (a) Replenishment time (b) Lead time
   (c) Idle time (d) Replacement Time
4. _____ is a function of re-arranging and re- packing as per individual orders. [c]
   (a) Break- Bulk (b) Warehousing
   (c) Cross Docking (d) Sorting
5. Break-Bulk warehouse performs _____ function. [c]
   (a) Warehousing (b) Collecting
   (c) Sorting (d) Supply
6. The _____ system should be designed after analysing the needs for the organization. [c]
   (a) Warehousing (b) Logistics
   (c) Material handling (d) Distribution
7. _____ is most suitable for remote and hilly areas. [a]
   (a) Road transport (b) Railway transport
   (c) Water transport (d) Pipeline
8. _____ is the fastest mode of transport. [d]
   (a) Road transport (b) Railway transport
   (c) Water transport (d) Air Transport
9. 3-PL stands for [b]
   (a) Three points logistics (b) Third party logistics
   (c) Three points location (d) The Party Logistics
10. _____ is the process of planning implementation and control of transportation services to achieve organization goals. [b]
   (a) Logistics Management (b) Transportation Management
   (c) Supply Chain Management (d) Distribution Management
11. _____ occurs when a company retains another business to perform some of its work activities. [a]
   (a) Outsourcing (b) KPO
   (c) 3PL (d) 4PL

Fill in the Blanks

1. WMS stands for _____
2. _____ levels are checked regularly by the companies to monitor the flow of goods in and out of a warehouse.
3. _____ is the area of physical distribution that has experienced the greatest change and improvement in efficiency.
4. _____ is a shipping method that transfers goods from one transportation mode to another to get them directly from the source to their destination.
5. _____ is a method of cross docking where goods move in a constant flow between the receiving and shipping areas.
6. The _____ arrangement method combines multiple small shipments before transportation.
7. _____ is a method of dividing large shipments into smaller batches.
8. PRM stands for _____
9. _____ involves the contracting out of a business function - commonly one previously performed in-house - to an external provider.
10. 3PL stands for _____

ANSWERS

1. Warehouse management systems
2. Inventory
3. Material handling
4. Cross docking
5. Continuous cross docking
6. Consolidation
7. De-consolidation
8. Product Recovery Management
9. Outsourcing
10. Third-Party Logistics

Very Short Questions and Answers

1. Freight Consolidation

Ans :

Freight consolidation activity is mainly intended to reduce the cost of transportation through bringing together smaller quantities of inventory in order to create a bigger quantity for transportation.

2. Cross docking

Ans :

Cross docking aims to reduce costs associated with transportation, warehousing, and storage. Cross docking also reduces the time spent transporting products by eliminating unnecessary steps such as unloading and storing items in a warehouse facility.

3. Forward Logistics

Ans :

Forward logistics refer to a process of planning, implementing and controlling the efficient flow of raw materials, component parts, finished goods and information, from the point of origin to the point of final consumption for the purpose of achieving customer satisfaction.

4. Reverse Logistics

Ans :

Whereas, in case of reverse logistics, raw materials, in-process inventories, finished products and information flows from the point of consumption to the point origin for the purpose of recapturing value or for their proper disposal.

5. Foruth-party Logistics

Ans :

"A 4PL acts as an integrator that is responsible for assembling the capabilities, technology and resources of its own organization with other organizations to design, build and run comprehen-sive supply chain solutions".

UNIT III

Designing the Supply Chain Network: Designing the Distribution Network, Role of Distribution, Factors Influencing Distribution, Design Options, e-Business and its Impact, Distribution Networks in Practice, Network Design in the Supply Chain, Role of Network, Factors Affecting the Network Design Decisions, Modeling for Supply Chain.

3.1 Designing the Distribution Network

3.1.1 Role of Distribution

Q1. Explain the role of distribution network in supply chain management.

Ans : **(Imp.)**

- Distribution is the steps taken to move and store a product from the production stage to the customer stage in a supply chain. Distribution directly affects cost and the customer experience and therefore drives profitability. There is a system of intermediaries between the producer of goods and/or services and the final users. A strong and efficient distribution network is one of the most important assets a manufacturer can possess.
- The distribution is one of the four elements of the marketing mix. The other three parts of the marketing mix are product, pricing, and promotion.
- Distribution is a key driver of the overall profitability of a company because it directly impacts both the supply chain costs and customer experience.
- Good distribution system serves the effectiveness of realising marketing strategy. This strategy is aimed at reaching certain levels of customer service.
- Distribution process involves each intermediary passing the product down the chain to the next organisation, before it finally reaches the consumer or end-user. This process is known as the distribution chain or the channel. Each of the elements in these chains will have their own specific needs, which the producer must take into account, along with those of the all-important end-user.
- A number of alternate channels of distribution may be available:
  - **Distributor:** who sells to retailers
  - **Retailer:** (dealer), who sells to end customers
  - **Advertisement:** typically used for consumption goods
- Distribution channels may not be restricted to physical products from producer to consumer in certain sectors. Both direct and indirect channels may be used. Hotels, for example, may sell their services directly or through travel agents, tour operators, airlines, tourist boards, centralised reservation systems, etc.
- There has been some sort of innovations in the distribution of services. For example, there has been an increase in franchising and in rental services. There has also been some evidence of service integration, with services linking together, particularly in the travel and tourism sectors. For example, links now exist between airlines, hotels and car rental services.
- Supply chain distribution often introduces middlemen into the economic market.
- Historically, supply chains were primarily found in the manufacturing and production industries. These companies transform raw materials such as timber, minerals, steel, and fabric into valuable goods ready for use by consumers.

- Manufacturing and production companies may not have resources available for delivering products into retail stores where consumers can safely shop and purchase items, so they depend upon supply chain distribution to complete the process.
- There is an increasing number of complicated supply chains. So, the distribution network design plays a key role in controlling the cost of doing business.
- The distribution network design involves :
  - Locating production plants and distribution warehouses.
  - Determining the best strategy for distributing the product from the plants to the warehouses and from the warehouses to the customers.
- The aim is to select the optimum numbers, locations and capacities of plants and warehouses to open so that all customer demand is satisfied at minimum total costs of the distribution network (including transportation and production costs).
- Since, controlling of the cost of doing business is an important factor; it can put supply chain network optimisation goals ahead of competitors. The choice of distribution network can achieve supply chain objectives from low cost to high responsiveness.

3.2 Factors Influencing Distribution

Q2. Explain the factors influencing distribution network design.

Ans : **(Imp.)**

- At the highest level, performance of a distribution network should be evaluated along two dimensions:
  (i) Customer needs that are met (influence the company's revenues).
  (ii) Cost of meeting customer needs (decide the profitability of the delivery network).
- Elements of customer service influenced by network structure are :

i) **Response time:** The time between when a customer places an order and receives delivery.

ii) **Product variety :** The number of different products/configurations that a customer desires from the distribution network.

iii) **Product availability :** The probability of having a product in stock when a customer order arrives.

iv) **Customer experience :** Includes the ease with which the customer can place and receive their order.

v) **Order visibility :** The ability of the customer to track their order from placement to delivery.

vi) **Returnability :** The ease with which a customer can return unsatisfactory merchandise and the ability of the network to handle such returns.

- Generally, a customer always wants the highest level of performance along with the above dimensions. However, in practice, this is not always the case. For example, customers ordering a book at Amazon.com are willing to wait longer than those that drive to a nearby store to get the same book. On the other hand, customers can find a far larger variety of books at Amazon compared to the nearby store.
- There can be customers who can tolerate a large response time. The firms target these customers and require few locations that may be far from the customer. They focus on increasing the capacity of each location.
- On the other hand, firms that target customers who value short response times need to locate close to them. Such firms must have many facilities, with each location having a low capacity. Thus, a decrease in the response time, which the customers desire, increases the number of facilities required in the networks.
- For example, ABC provides its customers with books on the same day but requires about 400 stores to achieve this goal for most of

the country. Amazon, on the other hand, takes about a week to deliver a book to its customers, but only uses about 5 locations to store its books.

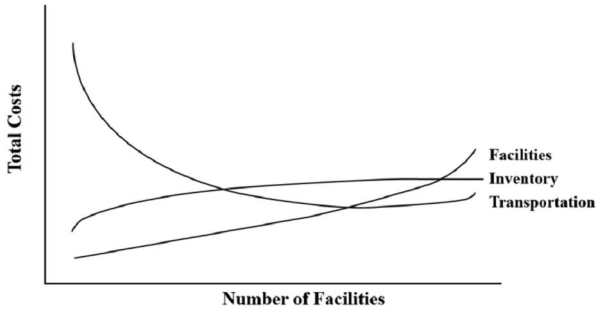


Fig.: Relationship between number of facilities and logistics cost

- Changing the distribution network design affects the following supply chain costs:
  - Inventories
  - Transportation
  - Facilities and handling
  - Information
- As the number of facilities in a supply chain increases, the inventory and resulting inventory costs also increase as shown in the above figure. As long as inbound transportation economies of scale are maintained, increasing the number of facilities decreases total transportation cost.
- A distribution network with more than one warehouse allows reduction of transportation cost relative to a network with a single warehouse. Facility costs decrease as the number of facilities is reduced, because a consolidation of facilities allows a firm to exploit economies of scale. Total logistics costs are the sum of inventory, transportation, and facility costs for a supply chain network.
- Distribution network design options must therefore be compared according to their impact on customer service and the cost to provide this level of service.

3.3 Design Options

Q3. Explain briefly various distribution options for a distribution network.

Ans : **(Imp.)**

Distribution network design options must be compared according to their impact on customer service and the cost to provide this level of service. There are two key decisions while designing a distribution network:

(i) Will product be delivered to the customer location or picked up from a predetermined site.

(ii) Will product flow through an intermediate location. The distribution networks have their relative strengths and weaknesses. Based on the choices for the two decisions, there are five distinct distribution network designs that are classified as follows:

1. Manufacturer storage with direct shipping (Drop shipping)

- The product is shipped directly from the manufacturer to the end customer, bypassing the retailer (who takes the order and initiates the delivery request). All inventories are stored at the manufacturer. Information flows from the customer, via the retailer, to the manufacturer, while product is shipped directly from the manufacturer to customers.
- The biggest advantage of drop shipping is the ability to centralise inventories at the manufacturer. A manufacturer can aggregate demand and provide a high level of product availability with lower levels of inventory than individual retailers.
- The benefits from such sort of centralisation are highest for high value, low volume items with unpredictable demand and vice verse. Thus, drop shipping would not offer a significant inventory advantage to an online grocer selling a staple item like detergent.

- Transportation costs are high with drop shipping because the average outbound distance to the end consumer is large and package carriers must be used to ship the product that have high shipping costs per unit compared to truckload carriers.
- With drop shipping, a customer order with items from several manufacturers will involve multiple shipments to the customer. This loss in aggregation in outbound transportation further increases cost.
- Supply chains save on the fixed cost of storage facilities when using drop shipping because all inventories are centralised at the manufacturer.
- There can be some savings of handling costs too because the transfer from manufacturer to retailer no longer occurs. Handling costs can be significantly reduced if the manufacturer has the capability to ship orders directly from the production line.

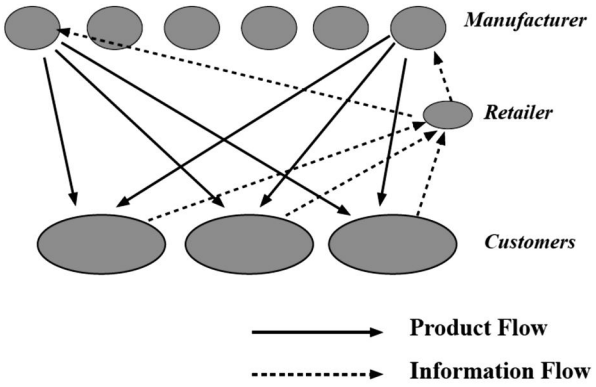


Fig. Manufacturer storage with direct shipping

- A good information infrastructure is needed so that the retailer can provide product availability information to the customer even though the inventory is located at the manufacturer.
- The information infrastructure requirement is simpler for direct sellers like Dell because two stages (retailer and manufacturer) do not need to be integrated.
- Response times tend to be large when drop shipping is used because the order has to be transmitted from the retailer to the manufacturer and shipping distances are on average longer from the manufacturer's centralised site. Also, the response time need not be identical for every manufacturer that is part of a customer order.
- Manufacturer storage with drop shipping allows a high level of product variety to be made available to the customer.
- Drop shipping provides a good customer experience in the form of delivery to the customer location. The experience, however, suffers when a single order containing products from several manufacturers is delivered in partial shipments.

2. Manufacturer storage with direct shipping and in-transit merge

- Unlike drop shipping where each product in the order is sent directly from each manufacturer to the end customer, in-transit merge combines pieces of the order coming from different locations so that the customer gets a single delivery. Information and product flows for the in-transit merge network.
- For example, when a customer orders a PC from ABC along with a XYZ monitor, the package carrier picks up the PC at the ABC factory, the monitor at the XYZ factory and merges the two together at a hub before making a single delivery to the customer.
- The ability to aggregate inventories and postpone product customisation is a significant advantage of in-transit merge.
- As from above example, in-transit merge allows ABC and XYZ to aggregate all their inventories at the factory. This approach will have the greatest benefits for products with high value whose demand is hard to estimate.

- The transportation costs are lower than drop shipping because of the merge that takes place at the carrier hub prior to delivery to the customer.
- An order with products from many manufacturers thus requires only one delivery to the customer. Fewer deliveries save transportation cost and simplify receiving process.

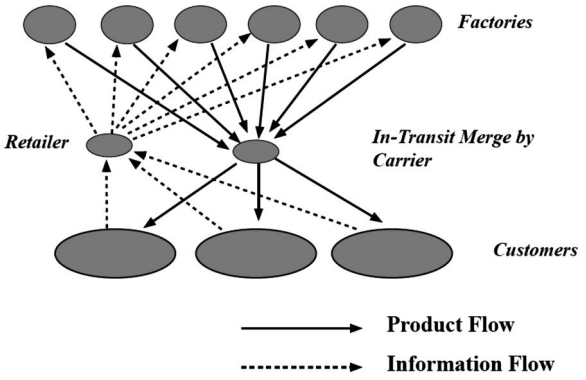


Fig.: Manufacturer storage with direct shipping and in-transit merge

- Overall supply chain facility and handling costs are somewhat higher than drop shipping.
- Sophisticated information infrastructure is needed to allow the in-transit merge.
- The information, operations at the retailer, manufacturers, and the carrier must be coordinated.
- Response times may be higher because of the need to perform the merge.
- Customer experience should be better than drop shipping because the customer receives only one delivery for their order instead of many partial shipments.
- The main advantage of in-transit merge over drop shipping is the lower transportation cost and improved customer experience.
- The major disadvantage is the additional effort during the merge.

3. Distributor storage with package carrier delivery

- Under this option, inventory is not held by manufacturers at the factories but is held by distributors or retailers in intermediate warehouses and package carriers are used to transport products from the intermediate location to the final customer. Information and product flows when using distributor storage with delivery by a package carrier.
- Transportation costs are somewhat lower for distributor storage compared to manufacturer storage because an economic mode of transportation (e.g. truckload) can be employed for inbound shipments to the warehouse, which is closer to the customer.

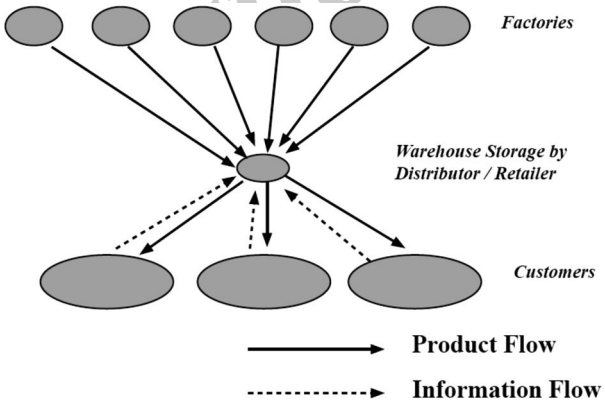


Fig.: Distributor storage with package carrier delivery

- Unlike manufacturer storage where multiple shipments may need to go out for a single customer order with multiple items, distributor storage allows outbound orders to the customer to be bundled into a single shipment further reducing transportation cost.
- For faster moving items, transportation savings from distributor storage relative to manufacturer storage increase.
- Compared to manufacturer storage, facility costs are somewhat higher with distributor storage because of a lack of aggregation. From a facility cost perspec-

tive, distributor storage is not good for extremely slow moving items.

- The information infrastructure needed with distributor storage is significantly less complex than the manufacturer storage.
- Response time with distributor storage is better than with manufacturer storage because distributor warehouses are closer to customers and the entire order is aggregated at the warehouse on shipping.
- Distributor storage can handle somewhat lower variety than manufacturer storage.

4. Distributor storage with last mile delivery

- Last mile delivery refers to the distributor / retailer delivering the product to the customer's home instead of using a package carrier. Peapod and Albertson's have used last mile delivery in the grocery industry. Unlike package carrier delivery, last mile delivery requires the distributor warehouse to be much closer to the customer, increasing the number of warehouses required.
- Distributor storage with last mile delivery requires higher levels of inventory because it has a lower level of aggregation.

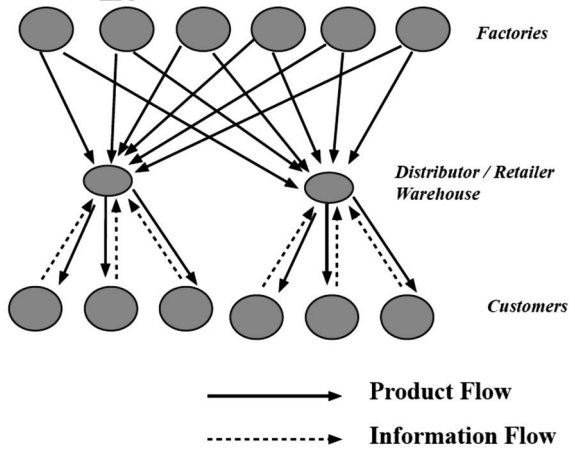


Fig.: Distributor storage with last mile delivery

- Transportation costs are highest using last mile delivery. This is because package carriers aggregate delivery across many retailers and are able to obtain better economies of scale than available to a distributor or retailer attempting last mile delivery.
- Last mile delivery is cheaper in dense cities.
- Transportation costs are reasonable for bulky products where the customer is willing to pay for home delivery. For example, home delivery for water and large bags of rice has proved quite successful in China, where the high population density has helped decrease delivery costs.
- Facility and processing costs are very high using this option given the large number of facilities required. For example, a grocery store doing last mile delivery performs all the processing until the product is delivered to the customer's home unlike a supermarket where there is much more customer participation.
- The information infrastructure with last mile delivery requires the additional capability of scheduling deliveries.
- Response times are faster than the use of package carriers.
- Product variety is generally lower than distributor storage with carrier delivery.

5. Manufacturer or distributor storage with costumer pickup

- In this approach, inventory is stored at the manufacturer or distributor warehouse but customers place their orders online or on the phone and then come to designate pickup points to collect their orders. Orders are shipped from the storage site to the pickup points as needed.
- Inventory costs using this approach can be kept low with either manufacturer or distributor storage to exploit aggregation.

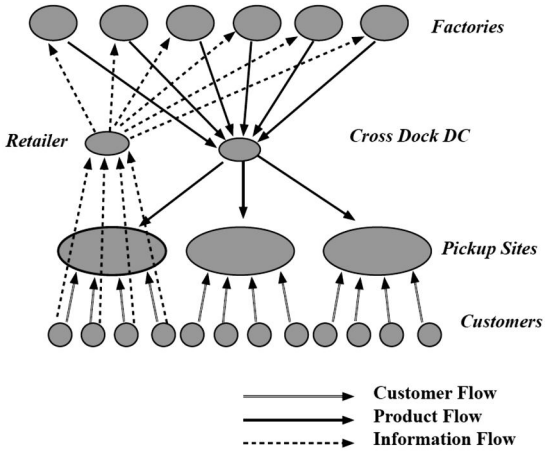


Fig.: Manufacturer or distributor storage with costumer pickup

- Transportation cost is lower than any solution using package carriers because significant aggregation is possible when delivering orders to a pickup site.
- Facility costs are high if new pickup sites have to be built.
- A significant information infrastructure is needed. A good coordination is needed between the retailer, the storage location, and the pickup location.
- The main advantage of a network with consumer pickup sites is that it can lower delivery cost, thus expanding the set of products sold as well as customers served online.
- The major hurdle is the increased handling cost at the pickup site.

3.4 E-BUSINESS AND ITS IMPACT

Q4. Define e-Business.

Ans :

Introduction

- Commerce, the exchange of valuable goods or services, has been conducted for thousands of years. Traditionally, commerce involved bringing traders, buyers, and sellers together in a physical marketplace to exchange information, products, services, and payments.
- Today, many business transactions occur across a telecommunications network where buyers, sellers, and others involved in the business transaction (such as the employees who process transactions) rarely see or know each other and may be anywhere in the world.
- This process of buying and selling of products and services across a telecommunications network is often called electronic commerce or e-commerce.
- Many people use the term "e-commerce" in a broader sense to encompass not only the buying and selling of goods, but also the delivery of information, the providing of customer service before and after a sale, the collaboration with business partners, and the effort to enhance productivity within organizations.
- Others refer to this broader spectrum of business activities that can be conducted over the Internet as e-business. Most people today use the terms "e-commerce" (in its broadest sense) and "e-business" interchangeably.
- The initial development of e-business transactions began more than thirty years ago when banks began transferring money to each other by using electronic funds transfer (EFT), and when large companies began sharing transaction information with their suppliers and customers via electronic data interchange (EDI).
- Using EDI, companies electronically exchange information that used to be traditionally submitted on paper forms, such as invoices, purchase orders, quotes, and bills of lading.
- This exchange occurs both with suppliers and customers (often called trading partners).
- These transmissions generally occur over private telecommunications networks called value-added networks, or VANs Because of the expense of setting up and maintaining these private networks and the costs associated with creating a standard interface between companies, implementing EDI has usually been beyond the financial reach of small and medium-sized companies.

- Today, companies of all sizes use a less expensive network alternative to VANs for the exchange of information, products, services, and payments the Internet.
- Global access to the Internet and the Web has changed the way people and businesses around the world communicate.

Q5. Explain the nature and scope of e-business.

Ans :

E-business or Online business means business transactions that take place online with the help of the internet. The term e-business came into existence in the year 1996. E-business is an abbreviation for electronic business. Therefore, the buyer and the seller do not meet personally.

E-business refers to all online business transactions including selling directly to consumers, dealing with manufactures and suppliers, and conducting interactions with partners.

- E-business includes e-commerce but also covers internal processes such as production, inventory management, product development, risk management, finance, knowledge management and human resources.
- E-business strategy is more complex, more focused on internal processes, and aimed at cost savings and improvements in efficiency, productivity and cost savings.
- E-Commerce has a narrower definition and only involves buying and selling goods and services over the Internet.

Q6. Explain the impact of e-business on supply chain management.

Ans : **(Imp.)**

- Electronic business, commonly referred as e-Business or e-business, or an internet business, may be defined as the application of information and communication technologies in support of all the activities of business.
- E-business is a term used to describe businesses that run on the internet, or utilise internet technologies to improve the profitability of a business.
- The entire process of setting up a website, helping the prospective customers navigate through the website, showing them the available products, offering discounts and vouchers and doing everything possible to encourage the prospective clients and converting them into customers, comes under the area of e-business.
- By selling products and services online, an e-business is able to reach a wider consumer base. This function of e-business is referred to as e-commerce, and the terms are occasionally used interchangeably. E-business is a vast term encompassing the various business processes that aim to integrate the vendors or traders with the consumers and suppliers using the internet.
- E-commerce, on the other hand, is a subset of e-business and refers to online transactions that can be accounted for in monetary terms. For instance, accepting credit card payment for products sold to consumers or making payments for shopping online are examples of e-commerce. Thus, simply saying, e-commerce refers to the last stage of e-business which involves collecting payments for the goods sold by the business firm.
- Wherein, commerce constitutes the exchange of products and services between businesses and groups and individuals, electronic commerce focuses on the use of information and communication technologies to enable the external activities and relationships of the business with individuals, groups and other businesses.
- An e-business may also use the internet to acquire wholesale products or supplies for in-house production. This facet of e-business is sometimes referred to as e-procurement.
- Using email and private websites as a method for dispensing internal memos and white

sheets is another use of the internet by e-business.

- A central server or email list can serve as an efficient method for distributing necessary information. The trend continues with new technologies, such as internet-enabled cell phones and laptops.
- It can be used for buying and selling of products. The electronic chat is widely in use nowadays which saves time. The technical support operators can remotely access a customer's computer and assist them in correcting a problem.
- Organisations are finding that their ability to respond to unpredicted changes in the market is becoming a key factor in survival. The ability to adjust e-business processes to customer references (flexibility) has become a necessity for online systems.

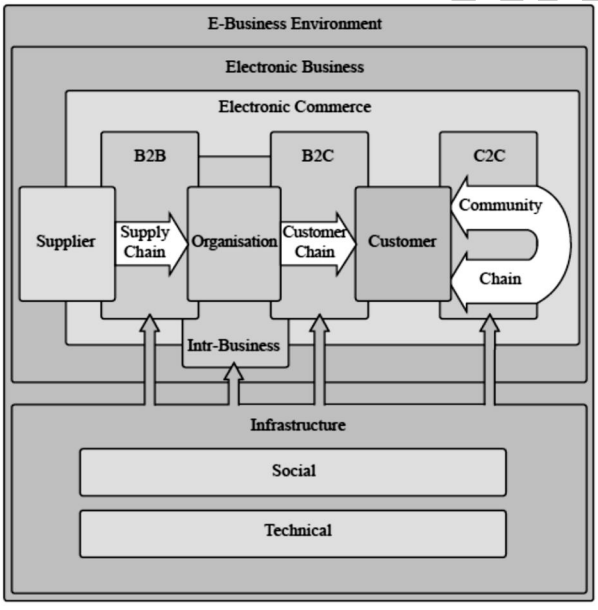


Fig.: Elements of e-business domain

B2B = Business to Business

B2C = Business to Consumer

C2C = Consumer to Consumer

Q7. Explain the advantages and disadvantages of e-business.

Ans : **(Imp.)**

Advantages

The advantages of e-business are described below:

1. Worldwide presence

- This is the biggest advantage of conducting business online. A firm engaging in e-business can have a nationwide or a worldwide presence.
- There are many examples which had the advantage by the use of e-business. IBM was one of the first companies to use the term e-business for servicing customers and collaborating with business partners from all over the world. Dell Inc. is another success story which too had a blooming business selling personal computers throughout the United States, only via telephone and the internet till the year 2007. Hence, worldwide presence is ensured if companies rethink their business in terms of the Internet.

2. Cost effective marketing and promotions

- Nowadays, the web is used to market products guarantees worldwide.
- Advertising techniques like pay per click advertising ensure that the advertiser only pays for the advertisements that are actually viewed.
- Affiliate marketing is a sort of marketing where customers are directed to a business portal because of the efforts of the affiliate who in turn receive a compensation for their efforts meeting with success. Affiliate marketing has helped both the business and the affiliates. The cost effective online advertising strategies are used in e-business.

3. Developing a competitive strategy

- In order to ensure a competitive advantage, an effective strategy should be

there to maintain the advantage and earn profits.

- It can be a cost strategy or a differentiation strategy.
- For example, till the year 2007, Dell Inc. was selling computers only via the internet and the phone. It adopted a differentiation strategy by selling its computers online and customizing its laptops to suit the requirements of the clients. Thus, e-business resulted in Dell Inc. managing to capture a vast market using the differentiation strategy.

4. Better customer service

- Customer services help in encouraging the customer to know more about the product or service.
- For example, on visiting a website, the customer is greeted by a pop-up chat window. Moreover, payments can be made online; home-delivery of products can be done.

Disadvantages

The disadvantages of e-business are described below:

1. Sectoral limitations

- Lack of growth in some of the sectors can be on the account of product or sector limitations.
- For instance, food sector has not experienced growth of sales and revenue generation because of a number of practical reasons like food products being perishable items. Also, consumers do not look for food products on the internet since they prefer going to the supermarket to buy the necessary items as and when the need arises.

2. Costly e-business solutions for optimisation

- Substantial resources are required for redefining product lines in order to sell online.
- Upgrading the computer systems, training personnel, and updating websites require substantial resources. Moreover, electronic data management and enterprise resource planning is necessary for ensuring optimal internal business processes. From the above discussion, it is observed that the advantages clearly overshadow the disadvantages of e-business.

Q8. Explain different forms of e-business and their role in supply chain management.

Ans :

The various forms of e-business applications can be divided into three types:

(a) e-Commerce

(b) e-Procurement

(c) e-Collaboration

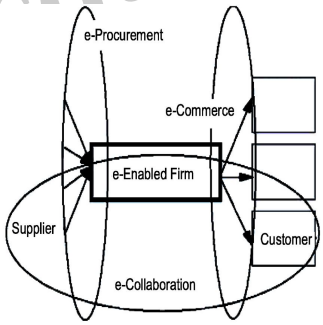


Fig.: E-Business Forms and their Impact on the Supply Chain

These three forms are shown in Figure 5.3. Each of the elements in this framework can be described as follows:

(a) E-Commerce

It assists the set-up of supply chain partners to recognize and respond quickly to the changing demands of customers collected over the Internet.

(b) E-Procurement

Using Internet, companies can procure different kind of materials; manage value-added services like transportation, storage of merchandise, customs clearing, payment, quality check, and documentation.

(c) E-Collaboration

It facilitates the synchronization of various actions and decisions among the supply chain partners, both suppliers and customers, over the Internet. For example, bringing together manufacturing changes in the bill-of-materials for a product that is manufactured by an outsourced partner.

Q9. Why is it said that e-procurement is a replica of e-commerce?

Ans :

It is the B2B or B2C purchase and sale of goods and services through the Internet and other information and networking systems. E- Procurement is the replica of e-commerce, yet both have their own unique features. For example, e-commerce is conducted by individual consumers, whereas e- procurement largely involves companies. The Internet offers a distinct platform which assists in effective purchase of goods and services as millions of buyers and sellers can easily find each other and can conduct transactions as per the specified norms (regulated by the marketplace or traders' internal rules). Generally, the material user initiates the e-procurement process by entering a materials request and other relevant information, such as quantity and date needed, into the material requisition module. The product description, closing dates, and bid conditions are specified on the requisition.

On satisfactory verification of the requisition, the buyer transfers the materials requisition data to the Internet-based e-procurement system and assigns qualified suppliers to bid on the requisition. The firm's computer system automatically routes transactions for approvals, sends the information along to the accounting system, and routes the purchase order directly to the supplier.

The Internet offers competitive advantage even to small companies as they can now sell their products at low cost on a larger scale similar to their competitors.

Benefits derived from implementing an e-procurement system include:

- **Time savings:** E-procurement is more efficient when selecting and maintaining a list of potential suppliers, processing requests for quotation and purchase orders, and making repeat purchases. Individual buyers can create preferred supplier lists for each category of products and services.
- **More efficient and flexible:** E-procurement is capable of matching hundreds of bids on a daily basis, this eliminates non-value-adding collection and sorting activities, duplicate data entry on the purchase order, etc. The system can be programmed to handle automatic bidding of frequently ordered items on a fixed interval, such as daily or weekly.
- **Cost savings:** Buyers can save costs by generating more purchases. Lower prices of goods and services are obtained since more suppliers can be contacted. The ability to purchase on a more frequent basis reduces inventory costs, results in lower administrative costs, and faster order fulfilment.
- **Accuracy:** The system eliminates double-key inputs and also enhances the accuracy of communications between buyers and suppliers. More information on goods and services are readily available on-line.
- **Real time:** The system enables buyers to initiate bids and suppliers to respond in real time on a 24-hour, 7-days-per-week basis. The seller can submit and check the status of bids, regardless of the buyer's geographical location and time of day. The buyer can process and communicate with suppliers regardless of the seller's geographical location and time of day. Once the material requisition is processed, the buyer can post the bid immediately. There is no waiting time.
- **Trackability:** Audit trails can be maintained for all transactions in electronic form. Tracing an electronic bid and transaction is much easier and faster than tracking paper trails. Buyers and suppliers can ask for additional information on-line, leave comments, or indicate whether they are interested in bidding.

E-Procurement benefits both buyers and sellers. For sellers there are lower barriers to entry and transaction costs, access to more buyers, and the ability to instantly ad-

just to market conditions. From the buyer's perspective, e-procurement becomes a viable option due to various factors such as tough competition, frequently changing customer demands and preferences, short product life cycle and creating a variety of products.

Q10. What is the role of e-colloration in SCM?

Ans :

E-Collaboration is the use of Internet based technologies to facilitate continuous automated exchange of information between supply chain partners. It relates to business-to-business relationships facilitated by the Internet.

E-Collaboration requires companies to work together by combining their operations and removing the obstacles that come in their way of satisfying customers. It also tries to drive out unnecessary cost. It does this by including activities such as information sharing and integration, decision sharing, process sharing, and resource sharing.

By using e-Collaboration, you can integrate previously separate aspects of the supply chain and enhance the value delivered to the consumer by providing a series of practical improvement concepts to unlockthis value. It is also easier to collaborate using computers than spending time in reaching your partners. Information reaches quickly, without being worried about security. E-Collaboration, in other words, creates an extended enterprise.

3.5 Distribution Networks in Practice

Q11. Explain about Distribution Networks in Practice.

Ans :

1. **The ownership structure of the distribution network can have as big an impact as the type of distribution network:** Distribution networks that have exactly the same physical flow but different ownership structures can have vastly different performance. Attempting to optimize over a distribution network with multiple enterprises requires great skill in coordinating the incentives of each of the players and in creating the right relationships.

2. **The choice of a distribution network has very long-term consequences:** The structure of the distribution network is one of the most difficult decisions to change. The impact often lasts for decades, amplifying the importance of the choice.

3. **Consider whether an exclusive distribution strategy is advantageous:** Another important choice is whether to distribute exclusively or not. For instance, a manufacturer of consumer electronics such as Sony could choose to have multiple or an exclusive distributer.

   (i) **Multiple distributors:** Sony would be interested in increasing the availability of its products to customers and would certainly not mind if its distributors competed with each other to sell Sony products to customers.

   (ii) **Exclusive distributor:** An alternative is to form an exclusive relationship with a distributor. In this case, customers can buy this brand's products only from a single retailer. The retailer can garner higher margins, as it doesn't have to battle over price with nearby store. The manufacturer can often increase its sales significantly, because its exclusive distributor will be much more interested in marketing the manufacturer's goods, as there is a higher margin and less competition.

4. **Product price, commoditization, and criticality affect the type of distribution system preferred by customers:** Interactions between a buyer and a seller take time and resources. Many buyers would like to establish a relationship with a single enterprise that can deliver a full line of products. This can be accomplished by a manufacturer with a broad line of products. However, this is often accomplished more effectively by distributor carrying products from many manufacturers.

A customer's desire for a one-stop shop depends not just on the convenience of the relationship, but also on the type of product he or she is buying. For example, a customer may well be content to buy a PC directly from manufacturer. However, very few customers are willing to order pens direct from a pen manufacturer, and paper directly from a paper manufacturer. Most customers much prefer a stationary store that carries a very wide range of different manufacturers' products.

5. **Integrate the Internet with the existing physical network**: To extract maximum benefit from e-business, firms should integrate it with their existing supply chain networks. Separating the two networks often results in inefficiencies within the supply chain. This coupling of e-business with the existing physical network has been referred to as clicks-and-mortar.

3.6 Network Design in the Supply Chain

3.6.1 Role of Network

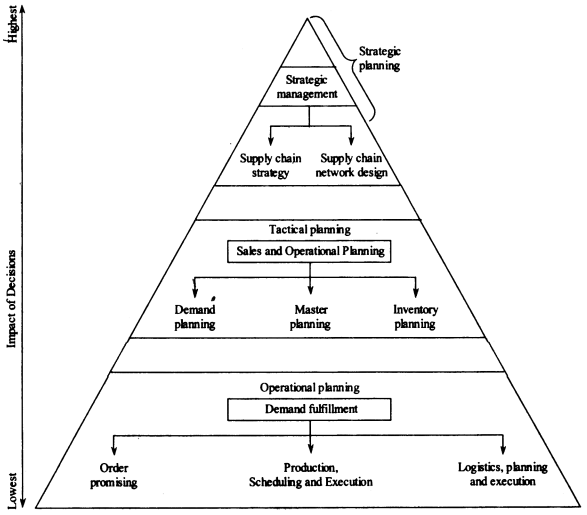
Q12. What do you mean by supply chain network design? State its objectives and challenges.

Ans : **(Imp.)**

Supply Chain Network Design

Supply chain network design is a process of determining the number of suppliers, the location of facilities, determining the product flow within the supply chain and location of distribution centres to effectively meet up the customer demand.

For the successful implementation of a supply chain strategy, it becomes necessary to align the supply chain network with that of supply chain strategy of the firm. Supply chain network design occupies the top most position in the supply chain pyramid which is responsible for managing the entire supply chain at tactical and operational level.



These decisions have a significant impact on the performance of supply chain as it plays a major role in deciding the tactical and operational processes of a supply chain thereby leading to the success of an organization.

Objectives

The objectives of supply chain network design includes:

(i) To optimize the facilities located in the supply chain,

(ii) To allocate optimum capacities and technical requirements to each facility.

(iii) To assign the sources and markets to facilitate the transportation of materials to minimum distances.

(iv) To minimize the overall costs of logistics and transportation.

Supply chain network design decisions should support the following strategic activities of the firm:

(a) Introduction of new product in the market.

(b) Optimal sourcing of materials

(c) Location of manufacturing plants

(d) Selection of target customers and location of facilities and

(e) Number of distribution centres to be located by considering the customer convenience and cost benefits.

Inspite of all the above activities supply chain network design needs to maintain appropriate trade-off with the other strategies of the supply chain such as: Inventory, manufacturing, procurement, distribution etc., so as to avoid the conflict among them.

Challenges of Network Design

With increased global competition, firm needs to produce innovative and customized products so as to gain market share through redesigning the existing network design. Traditionally the network designs undergo the process of redesigning under rare situations. However, with the changing global market conditions, it became necessary to frequently to update the design of supply chain network according to the tastes and preferences of the customers.

The challenges faced by the supply chain network includes:

- Lack of appropriate levels of flexibility in the configurational pattern of supply chain network has failed to respond to the changing demand and supply requirements.
- Emergence of rapid demand for the initiation of product variety.
- The difficulty in deciding upon the appropriate distribution channel.

The reasons for these challenges in the supply chain network arises as a result of increased complexity in supply chain resulted from the expansion of firms operations in domestic markets to global markets. If the supply chain strategy is implemented without proper planning at the strategic level, it only increases the cost burden on the firm thereby making the entire process a complicated affair.

3.6.2 Factors Affecting the Network Design Decisions

Q13. Describe the various Factors Affecting the Network Design Decisions.

Ans : **(Imp.)**

Following are the factors that influence the decision of distribution network design :

1. Centralisation vs. Regionalisation

- In distribution network planning, there is a well-established relationship between the number of distribution points, transportation costs and customer service targets.
- Graphically, the point at which these three entities merge is the optimum balance of facility and transportation costs to develop a low-cost, high service distribution network.
- As the distribution networks become more centralised, the internal support structures such as facility management, order entry, customer service and data processing also do the same. Degree of centralisation achieved determines the cost savings over decentralised networks.
- However, service levels, limitations on total facility size and risk mitigation must be factored into the decision.

2. Energy

- Considerable shifts in the cost of energy (for example, electricity, fuel, etc.) can have an impact on operating costs and, as a result, on distribution.
- Distribution projects may fail once the cost of energy turns into an influencing factor, for example, energy intensive facilities such as refrigerated warehouses.
- Thus, it is critical to work with all energy providers to determine the load that an operation would put on the local energy system and develop solutions that conserve energy while achieving goals. Some interesting energy solutions can be abatement programs (high power generator or solar power) to run normally on a reduced energy load or high-efficiency units.
- Even if the transportation is handled via third party carriers, rising fuel costs make a very sensitive component of distribution costs.
- Some strategies to consider mitigating this can be cube out containers, transportation management systems, private fleet concerns etc.

3. Flexibility

- When designing a distribution facility, versatile equipment should be specified.
- In the beginning, the latest technology can make a good start but becomes a waste of money if it can't keep a pace with unpredictable events.
- Planning for probable or doubtful changes in the distribution profile should drive the warehouse design and equipment specifications.
- For the majority of distribution operations, flexible equipment is the more practical choice.

3. Global market place

- Preparedness is the critical element in a global marketplace.
- The supply chain is ever-changing and has a global impact that needs to be considered.
- This could be as minor as a domestic customer wanting direct shipments to an international location, or as major as an acquisition by a global company or addition of a key global account.
- Transportation systems should be designed with exports in mind. Proper customs documentation and international shipping paperwork should be done. Operations should be designed in a manner that product re-labelling or special packaging for international customers can be done easily.
- Facilities may be needed to accommodate inbound or outbound airfreight or ocean freight containers.
- Customer service functions may need to operate in 24-hour mode to assist customers in all time zones.

4. Government involvement

- The involvement of government has an impact on distribution.
- The distribution system should be aware of legislation that involves their industry.
- Many decisions are made daily at a local, state, and federal level that impact distribution operations. Taxes, labour regulations, transportation restrictions and infrastructure decisions are continually up for review and discussion at every level of government.

5. Information systems

- In today's e-world, timely and accurate information is needed. The days of daily distribution activity and nightly updates to financial systems are done.

Today distribution execution systems must be.

- **Real-time:** Customer requirements are moving toward being able to instantly track an order through every step of the fulfilment process to delivery. The information is linked to internet where a customer can easily log in and see the exact status of their order. Real-time interfaces and host system updates enable the customer.
- **Paperless:** Language and educational barriers result in error-prone paper documents that are often misinterpreted, at best resulting in loss within the distribution operation or, worse still, lost customers due to fulfilment issues. The solution is paperless systems requiring operator validation.
- **Standardised:** Standardised, industry-tailored software is now the rule.

6. Modularity

- As companies in the distribution space move, their business will typically jump to a new distributor or distributors.
- The ability to quickly take on significant business volumes dictates that modularity is a necessity for a thriving distribution organisation.
- Modularity must be evident in.
- **Assets:** Distribution assets must be modular, providing the ability to easily expand facilities, capacities and equipment to meet increasing demands and

diverse products. Many companies design this into a facility.

- **Work assignments:** The workforce must be able to handle new work assignments and transfer knowledge to new employees effectively.
- **Labour management systems:** These systems must be able to handle the addition of new operations quickly and economically so that performance can be measured and costs can be kept under control.

7. Off-highway vehicles

- In many countries, issues regarding the environment and air quality continue.
- These issues for stringent air-quality regulations will impact the warehouse.
- Electric vehicles will take over as the preferred models in the warehouse.

8. Pace

- Access to a web site can now order product, specify their service requirements, pay for their order on-line, and track the order right to their doorstep.
- For distributors, this means that the pace of distribution must increase significantly to account for the reduced times, shorter product lives, increased inventory turnover and greater customer expectations that is considered standard in the modern business-to-business and business-to-consumer marketplace.
- For example, if a customer places an order today with next-day delivery, a company picks and ships the order the next day. This won't be competitive and the entire supply chain needs to keep pace, from vendor compliance to information and execution systems in order to support the new economy.

9. People

- Team-based, participatory organisational culture and a total dedication to customer satisfaction are the components of success in supply chain distribution network.
- For example, employee celebration days, employee suggestion programs, revised organisational designs, compensation or incentive or bonus plans, and other processes that directly tie the distribution associate.

10. Price

- The service and quality are key factors in selecting a distribution partner.
- Modern free enterprise demands efficient, effective and low-cost distribution.
- The goal of a successful distribution operation should be to operate within their core values at the lowest cost possible. The path to competitive pricing is to operate efficiently and flexibly at low cost.

11. Accountability

- A successful distribution operation must have accountability.
- Accountability is made possible by effective leadership, clear communications and efficient systems and equipment to enable productive operations and a fulfilling work environment. Effective leadership make difficult decisions while maintaining the commitment of the organisation. Accountability requires establishing standards, identifying improvement opportunities and measuring performance.

12. Reverse logistics

- The challenge is the question of handling the products that are coming back into the operation.
- The decision on whether to accept the product, whether a refused shipment, an authorized customer return, or an unexpected return must be planned for and communicated with the distribution operation.

13. Third party logistics

- A growing number of companies are turning to third party logistics organisations to handle the customer fulfilment in the supply chain.
- Companies that are accustomed to true partnering with customers and suppliers have less trouble moving to the third party logistics and achieving the potential cost savings.
- The key steps are to conduct a complete search for the right third party logistics vendor, thoroughly review cost proposals and contracts to ensure there is financial benefit, and work with the third party logistics.

14. Variety

- Special packaging, pricing, labelling and delivery requirements are becoming the norm and must be addressed in any distribution plan. These tasks should be designed into the operation.
- Many companies invest large amounts of capital setting up specialised packing or value-added services to gain competitive advantages.
- Properly planned, these services can give profits, providing differentiation in a competitive marketplace.

3.7 MODELING FOR SUPPLY CHAIN

Q14. Discuss the model of supply chain.

Ans : **(Imp.)**

- The supply chain models, which address both the upstream and downstream sides.
- The Supply-Chain Operations Reference model (SCOR) measures total supply chain performance. It is a process reference model for supply-chain management, spanning from the supplier's supplier to the customer's customer. It is the most widely used model.
- It includes delivery and order fulfilment performance, production flexibility, warranty and returns processing costs, inventory and asset turns, and other factors in evaluating the overall effective performance of a supply chain.

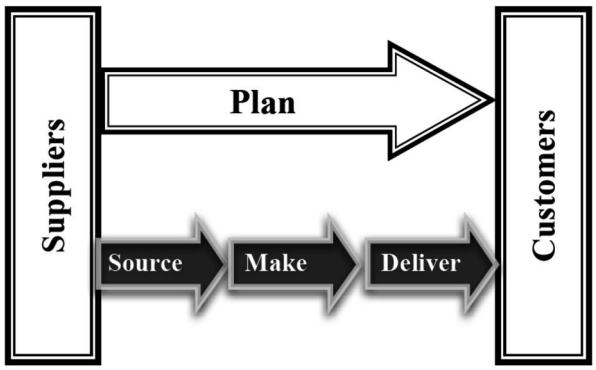


Fig.: Supply chain model

- SCOR is based on five distinct management processes: Plan, Source, Make, Deliver, and Return.
  - **Plan:** Processes that balance aggregate demand and supply to develop a course of action which best meets sourcing, production, and delivery requirements.
  - **Source:** Processes that procure goods and services to meet planned or actual demand.
  - **Make:** Processes that transform product to a finished state to meet planned or actual demand.
  - **Deliver:** Processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management.
  - **Return:** Processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support.

Short Question and Answers

1. Distribution Network.

Ans :

- Distribution is the steps taken to move and store a product from the production stage to the customer stage in a supply chain. Distribution directly affects cost and the customer experience and therefore drives profitability. There is a system of intermediaries between the producer of goods and/or services and the final users. A strong and efficient distribution network is one of the most important assets a manufacturer can possess.
- The distribution is one of the four elements of the marketing mix. The other three parts of the marketing mix are product, pricing, and promotion.
- Distribution is a key driver of the overall profitability of a company because it directly impacts both the supply chain costs and customer experience.

2. Define e-Business.

Ans :

Introduction

- Commerce, the exchange of valuable goods or services, has been conducted for thousands of years. Traditionally, commerce involved bringing traders, buyers, and sellers together in a physical marketplace to exchange information, products, services, and payments.
- Today, many business transactions occur across a telecommunications network where buyers, sellers, and others involved in the business transaction (such as the employees who process transactions) rarely see or know each other and may be anywhere in the world.
- This process of buying and selling of products and services across a telecommunications network is often called electronic commerce or e-commerce.
- Many people use the term "e-commerce" in a broader sense to encompass not only the buying and selling of goods, but also the delivery of information, the providing of customer service before and after a sale, the collaboration with business partners, and the effort to enhance productivity within organizations.

3. Nature and scope of e-business.

Ans :

E-business or Online business means business transactions that take place online with the help of the internet. The term e-business came into existence in the year 1996. E-business is an abbreviation for electronic business. Therefore, the buyer and the seller do not meet personally.

E-business refers to all online business transactions including selling directly to consumers, dealing with manufactures and suppliers, and conducting interactions with partners.

- E-business includes e-commerce but also covers internal processes such as production, inventory management, product development, risk management, finance, knowledge management and human resources.
- E-business strategy is more complex, more focused on internal processes, and aimed at cost savings and improvements in efficiency, productivity and cost savings.
- E-Commerce has a narrower definition and only involves buying and selling goods and services over the Internet.

4. Advantages of e-business

Ans :

(i) Worldwide presence

- This is the biggest advantage of conducting business online. A firm engaging in e-business can have a nationwide or a worldwide presence.

- There are many examples which had the advantage by the use of e-business. IBM was one of the first companies to use the term e-business for servicing customers and collaborating with business partners from all over the world. Dell Inc. is another success story which too had a blooming business selling personal computers throughout the United States, only via telephone and the internet till the year 2007. Hence, worldwide presence is ensured if companies rethink their business in terms of the Internet.

(ii) Cost effective marketing and promotions

- Nowadays, the web is used to market products guarantees worldwide.
- Advertising techniques like pay per click advertising ensure that the advertiser only pays for the advertisements that are actually viewed.
- Affiliate marketing is a sort of marketing where customers are directed to a business portal because of the efforts of the affiliate who in turn receive a compensation for their efforts meeting with success. Affiliate marketing has helped both the business and the affiliates. The cost effective online advertising strategies are used in e-business.

(iii) Developing a competitive strategy

- In order to ensure a competitive advantage, an effective strategy should be there to maintain the advantage and earn profits.
- It can be a cost strategy or a differentiation strategy.
- For example, till the year 2007, Dell Inc. was selling computers only via the internet and the phone. It adopted a differentiation strategy by selling its computers online and customizing its laptops to suit the requirements of the clients. Thus, e-business resulted in Dell Inc. managing to capture a vast market using the differentiation strategy.

5. Disadvantages of e-business.

Ans :

(i) Sectoral limitations

- Lack of growth in some of the sectors can be on the account of product or sector limitations.
- For instance, food sector has not experienced growth of sales and revenue generation because of a number of practical reasons like food products being perishable items. Also, consumers do not look for food products on the internet since they prefer going to the supermarket to buy the necessary items as and when the need arises.

(ii) Costly e-business solutions for optimisation

- Substantial resources are required for redefining product lines in order to sell online.
- Upgrading the computer systems, training personnel, and updating websites require substantial resources. Moreover, electronic data management and enterprise resource planning is necessary for ensuring optimal internal business processes. From the above discussion, it is observed that the advantages clearly overshadow the disadvantages of e-business.

6. Supply Chain Network Design.

Ans :

Supply chain network design is a process of determining the number of suppliers, the location of facilities, determining the product flow within the supply chain and location of distribution centres to effectively meet up the customer demand.

For the successful implementation of a supply chain strategy, it becomes necessary to align the supply chain network with that of supply chain strategy of the firm. Supply chain network design occupies the top most position in the supply chain pyramid which is responsible for managing the entire supply chain at tactical and operational level.

7. Objectives of supply chain network design.

Ans :

(i) To optimize the facilities located in the supply chain,

(ii) To allocate optimum capacities and technical requirements to each facility.

(iii) To assign the sources and markets to facilitate the transportation of materials to minimum distances.

(iv) To minimize the overall costs of logistics and transportation.

8. Challenges of Network Design.

Ans :

- Lack of appropriate levels of flexibility in the configurational pattern of supply chain network has failed to respond to the changing demand and supply requirements.
- Emergence of rapid demand for the initiation of product variety.
- The difficulty in deciding upon the appropriate distribution channel.

9. e-colloration in SCM.

Ans :

E-Collaboration is the use of Internet based technologies to facilitate continuous automated exchange of information between supply chain partners. It relates to business-to-business relationships facilitated by the Internet.

E-Collaboration requires companies to work together by combining their operations and removing the obstacles that come in their way of satisfying customers. It also tries to drive out unnecessary cost. It does this by including activities such as information sharing and integration, decision sharing, process sharing, and resource sharing.

10. Benefits of e-procurement.

Ans :

- **Time savings:** E-procurement is more efficient when selecting and maintaining a list of potential suppliers, processing requests for quotation and purchase orders, and making repeat purchases. Individual buyers can create preferred supplier lists for each category of products and services.
- **More efficient and flexible:** E-procurement is capable of matching hundreds of bids on a daily basis, this eliminates non-value-adding collection and sorting activities, duplicate data entry on the purchase order, etc. The system can be programmed to handle automatic bidding of frequently ordered items on a fixed interval, such as daily or weekly.

Choose the Correct Answer

1. Factors affecting network design decisions. [d]

   (a) Strategic factor (b) Micro economic factor

   (c) Competitive factor (d) All the above

2. Role of distribution in supply chain management [d]

   (a) Providing localised services

   (b) Collecting product reviews from customers which could be used by manufacturers

   (c) Reduces inventory holding cost

   (d) All the above

3. The logistics strategic analysis [b]

   (a) Reflects the capability of the management to think beyond the current way.

   (b) Reflects the extent of use of logistical component for competitive advantage.

   (c) Ensures effective implementation of logistics strategy.

   (d) Deals with managing change.

4. Properly designed _____ helps in reducing total logistical cost. [d]

   (a) Logistics (b) Warehouse

   (c) Distribution (d) Logistical network

5. The term _____ refers to any idle resources that can be put to some future use. [a]

   (a) Inventory (b) Warehousing

   (c) Logistics (d) Procurement

6. _____ is the task of buying goods of right quality, in the right quantities, at the right time and at the right price. [d]

   (a) Supplying (b) Scrutinizing

   (c) Selling (d) Purchasing

7. In Railway transportation the ownership in with _____. [d]

   (a) Manufacturer (b) Third Party

   (c) Buyer (d) Government

8. DRP stands for _____. [a]

(a) Distribution requirement planning (b) Dividend requirement planning

(c) Distribution resource planning (d) Distribution reverse planning

9. The objective of performance measure is to achieve a _____. [c]

(a) Benchmark (b) Perfect distribution

(c) Perfect order (d) Goal

10. _____ is the fastest mode of transport. [d]

(a) Road transport (b) Railway transport

(c) Water transport (d) Air Transport

Fill in the blanks

1. The _____ is one of the four elements of the marketing mix.
2. _____ requires companies to work together by combining their operations and removing the obstacles
3. _____ costs are reasonable for bulky products where the customer is willing to pay for home delivery.
4. EFT stands for _____.
5. This process of buying and selling of products and services across a telecommunications network is often called _____.
6. _____ is made possible by effective leadership, clear communications and efficient systems and equipment to enable productive operations and a fulfilling work environment.
7. SCOR stands for _____.
8. _____ with last mile delivery requires higher levels of inventory because it has a lower level of aggregation.
9. _____ costs are highest using last mile delivery.
10. _____ is a term used to describe businesses that run on the internet.

ANSWERS

1. Distribution
2. E-Collaboration
3. Transportation
4. Electronic funds transfer
5. Electronic commerce
6. Accountability
7. Supply-Chain Operations Reference Model
8. Distributor storage
9. Transportation
10. E-business

Very Short Questions and Answers

1. Distribution.

Ans :

Distribution is the steps taken to move and store a product from the production stage to the customer stage in a supply chain.

2. E-Commerce.

Ans :

It assists the set-up of supply chain partners to recognize and respond quickly to the changing demands of customers collected over the Internet.

3. E-Procurement.

Ans :

Using Internet, companies can procure different kind of materials; manage value-added services like transportation, storage of merchandise, customs clearing.

4. E-Collaboration.

Ans :

It facilitates the synchronization of various actions and decisions among the supply chain partners, both suppliers and customers, over the Internet.

5. Supply Chain Network Design.

Supply chain network design is a process of determining the number of suppliers, the location of facilities, determining the product flow within the supply chain.

UNIT IV

Supply Chain Performance: Bullwhip Effect and Reduction, Performance Measurement: Dimension, Tools of Performance Measurement, SCOR Model. Demand Chain Management, Global Supply Chain, Challenges in Establishing Global Supply Chain, Factors that influence Designing Global Supply Chain Network.

4.1 Bullwhip Effect and Reduction

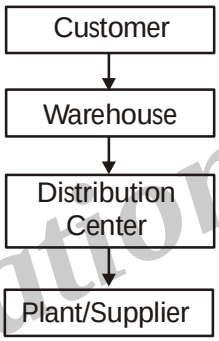
Q1. What is Bullwhip Effect? How Do minimize the bullwhip effect?

Ans : **(Imp.)**

The bullwhip effect on the supply chain occurs when changes in consumer demand causes the companies in a supply chain to order more goods to meet the new demand. The bullwhip effect is a distribution channel phenomenon, rather problem, in which demand forecasts yield supply chain inefficiencies. This mostly happens when retailers become highly reactive to consumer demand, and in turn, intensify expectations around it. This results into inefficient asset allocations and high inventory fluctuations, moving down in the supply chain.

- The bullwhip effect usually flows up the supply chain, starting with the retailer, wholesaler, distributor, manufacturer and then the raw materials supplier.
- This effect can be observed through most supply chains across several industries, it occurs because the demand for goods is based on demand forecasts from companies, rather than actual consumer demand.
- The bullwhip effect can be explained as an occurrence detected by the supply chain where orders sent to the manufacturer and supplier create larger variance then the sales to the end customer.
- These irregular orders in the lower part of the supply chain develop to be more distinct higher up in the supply chain.

BULLWHIP EFFECT



Minimize the bullwhip effect

Every industry has its own unique supply chain, inventory placements, and complexities. However, after analyzing the bullwhip effect and implementing improvement steps, inventories in the range of 10 to 30 percent can be reduced and 15 to 35 percent reduction in instances of stockout situations and missed customer orders can be achieved. Below are some of the methods to minimize the bullwhip effect.

I. Accept and understand the bullwhip effect

The first and the most important step towards improvement is the recognition of the presence of the bullwhip effect. Many companies fail to acknowledge that high buffer inventories exist throughout their supply chain. A detailed stock analysis of the inventory points from stores to raw material suppliers will help uncover idle excess inventories. Supply chain managers can further analyze the reasons for excess inventories, take corrective action and set norms.

2. Improve the inventory planning process

Inventory planning is a careful mix of historical trends for seasonal demand, forward-looking demand, new product launches and discontinuation of older products. Safety stock settings and min-max stock range of each inventory point need to be reviewed and periodically adjusted. Inventories lying in the entire network need to be balanced based on regional demands. Regular reporting and early warning system need to be implemented for major deviations from the set inventory norms.

3. Improve the raw material planning process

Purchase managers generally tend to order in advance and keep high buffers of raw material to avoid disruption in production. Raw material planning needs to be directly linked to the production plan. Production plan needs to be released sufficiently in advance to respect the general purchasing lead times. Consolidation to a smaller vendor base from a larger vendor base, for similar raw material, will improve the flexibility and reliability of the supplies. This, in turn, will result in lower raw material inventories.

4. Collaboration and information sharing between managers

There might be some inter-conflicting targets between purchasing managers, production managers, logistics managers and sales managers. Giving more weight to common company objectives in performance evaluation will improve collaboration between different departments. Also providing regular and structured inter-departmental meetings will improve information sharing and decision-making process.

5. Optimize the minimum order quantity and offer stable pricing

Certain products have high minimum order-quantity for end customers resulting in overall high gaps between subsequent orders. Lowering the minimum order quantity to an optimal level will help provide create smoother order patterns. Stable pricing throughout the year instead of frequent promotional offers and discounts may also create stable and predictable demand.

Q2. Discuss various factors influencing Bull-Whip Effect.

Ans :

The following are the factors which are responsible for the increase in variability in supply chain or bull-whip effect,

(i) Demand forecasting

(ii) Increased lead times

(iii) Batch ordering

(iv) Price fluctuations

(v) Inflated orders.

(i) Demand Forecasting

The phenomenon of bull-whip effect is caused due to the use of traditional inventory management methods. Firm always use inventory control techniques mostly periodic review policy. In this policy warehouses need to ascertain the target inventory level, the base stock level by reviewing the inventory position periodically. On the basis of such reviews the warehouses can place an order for maintaining the base-stock level. The base stock level should be maintained equal to the demand required in lead-time and review period. Safety stock should also be maintained to reduce the bottlenecks in supply.

Base-stock level and safety stock can be determined by estimating average demand and demand variations across the supply chain using standard forecast smoothing techniques. These estimates drives the warehouse manager to vary the order quantities which results in bull whip effect.

(ii) Lead Time

The demand variability increases with an increase in lead time, as the lead times has significant impact on the level of safety stock and base stock estimations.

$$\text{Safety stock/Base stock level} = (L + r) \times \sigma_{cd} \times \sqrt{r} + L$$

L = Lead time

r = Review period

σ_{cd} = Standard deviation of consumer demand.

Any increase in lead time would result in the change in safety stock and base stock level, which further results in variations in order quantities. These variations ultimately results in the bull-whip effect.

(iii) Batch Ordering

Batch ordering has a significant impact on increase in variability in order quantities. If a retailer follow (Q, R) policy i.e., batch order policy then he would place a bulk order to the wholesalers and sees that he does not place any order for several periods. Again after sometime he would place a bulk order and so on. This pattern would result in significant fluctuations in the order quantities which are placed to the wholesalers.

Firms often make use of batch ordering because of the following reasons,

- To reduce the order costs
- To reduce the transportation costs
- To avail the discounts for making bulk purchases.

(iv) Price Fluctuations

Fluctuations in price also affects the demand variations. In order to sustain the price fluctuations most of the retailers place orders in bulk when the prices are low. Whereas in the normal times they will place standard orders only to that they do not incur much/greater losses.

(v) Inflated Orders

Sometimes, retailers would go for the inflated orders for the products which are scarce in nature. After this period retailers will place standard orders. These changes in order quantities due to shortage of supply would lead to variations in demand estimates which further results in bull-whip effect.

4.2. Performance Measurement Dimension

Q3. What is performance measurement?

Ans :

- Performance measurement is the process used to assess the efficiency and effectiveness of projects, programs and initiatives.
- It is a systematic approach to collecting, analyzing and evaluating how "on track" a project/ program is to achieve its desired outcomes, goals and objectives.
- Performance measurement is typically done by an organization to demonstrate accountability, support decision making and improve processes.
- It is not an approach that prescribes what must be measured; organizations need to develop their own performance measures based on their project plans and situation.
- Performance measurement should be treated as an integral part of any planning process from the outset and should be built into any plan or project that has clear goals and objectives.
- Performance measures provide the information to assist in making strategic decisions about what an organization does and how it performs.
- Performance measurement frameworks are flexible and can be used to measure the effectiveness of a pilot project, a multi-year program or a strategic planning process and can be applied to a new or existing initiative.

4.2.1. Tools of Performance Measurement

Q4. Explain various tools of performance measurement in supply chain management

Ans : **(Imp.)**

Supply chain performance measure can be defined as an approach to judge the performance of supply chain system.

Supply chain performance measures can broadly be classified into two categories:

- **Qualitative Measures:** For example, customer satisfaction and product quality.
- **Quantitative Measures:** For example, order-to-delivery lead time, supply chain response time, flexibility, resource utilization, delivery performance.

Here, we will be considering the quantitative performance measures only. The performance of a supply chain can be improvised by using a multi-dimensional strategy, which addresses how the company needs to provide services to diverse customer demands.

Quantitative Measures

Mostly the measures taken for measuring the performance may be somewhat similar to each other, but the objective behind each segment is very different from the other.

Quantitative measures is the assessments used to measure the performance, and compare or track the performance or products. We can further divide the quantitative measures of supply chain performance into two types. They are:

1. Non-financial measures
2. Financial measures

1. Non - Financials Measures

The metrics of non-financial measures comprise cycle time, customer service level, inventory levels, resource utilization ability to perform, flexibility, and quality. In this section, we will discuss the first four dimensions of the metrics:

(i) Cycle Time

Cycle time is often called the lead time. It can be simply defined as the end-to-end delay in a business process. For supply chains, cycle time can be defined as the business processes of interest, supply chain process and the order-to-delivery process. In the cycle time, we should learn about two types of lead times. They areas follows:

- Supply chain lead time
- Order-to-delivery lead time

The order-to-delivery lead time can be defined as the time of delay in the middle of the placement of order by a customer and the delivery of products to the customer. In case the item is in stock, it would be similar to the distribution lead time and order management time. If the ordered item needs to be produced, it would be the summation of supplier lead time, manufacturing lead time, distribution lead time and order management time.

The supply chain process lead time can be defined as the time taken by the supply chain to transform the raw materials into final products along with the time required to reach the products to the customer's destination address.

Hence it comprises supplier lead time, manufacturing lead time, distribution lead time and the logistics lead time for transport of raw materials from suppliers to plants and for shipment of semi-finished/finished products in and out of intermediate storage points.

Lead time in supply chains is governed by the halts in the interface because of the interfaces between suppliers and manufacturing plants, between plants and warehouses, between distributors and retailers and many more.

Lead time compression is a crucial topic to discuss due to the time based competition and the collaboration of lead time with inventory levels, costs, and customer service levels.

(ii) Customer Service Level

The customer service level in a supply chain is marked as an operation of multiple unique performance indices. Here we have three measures to gauge performance. They are as follows:

- **Order fill Rate:** The order fill rate is the portion of customer demands that can be easily satisfied from the stock available. For this portion of customer demands, there is no need to consider the supplier lead time and the manufacturing lead time. The order fill rate could be with respect to a central ware-

house or a field warehouse or stock at any level in the system.

- **Stockout Rate:** It is the reverse of order fill rate and marks the portion of orders lost because of a stockout.
- **Backorder Level:** This is yet another measure, which is the gauge of total number of orders waiting to be filled.
- **Probability of on-time delivery:** It is the portion of customer orders that are completed on-time, i.e., within the agreed-upon due date.

In order to maximize the customer service level, it is important to maximize order fill rate, minimize stockout rate, and minimize backorder levels.

(iii) Inventory Levels

As the inventory-carrying costs increase the total costs significantly, it is essential to carry sufficient inventory to meet the customer demands. In a supply chain system, inventories can be further divided into four categories.

- Raw materials
- Work-in-process, i.e., unfinished and semi-finished sections
- Finished goods inventory
- Spare parts

Every inventory is held for a different reason. It's a must to maintain optimal levels of each type of inventory. Hence gauging the actual inventory levels will supply a better scenario of system efficiency.

(iv) Resource Utilization

In a supply chain network, huge variety of resources is used. These different types of resources available for different applications are mentioned below.

- **Manufacturing Resources:** Include the machines, material handlers, tools, etc.
- **Storage Resources:** Comprise warehouses, automated storage and retrieval systems.
- **Logistics Resources:** Engage trucks, rail transport, air-cargo carriers, etc.
- **Human Resources:** Consist of labor, scientific and technical personnel.
- **Financial Resources:** Include working capital, stocks, etc.

In the resource utilization paradigm, the main motto is to utilize all the assets or resources efficiently in order to maximize customer service levels, reduce lead times and optimize inventory levels.

2. Financial Measures

The measures taken for gauging different fixed and operational costs related to a supply chain are considered the financial measures. Finally, the key objective to be achieved is to maximize the revenue by maintaining low supply chain costs.

There is a hike in prices because of the inventories, transportation, facilities, operations, technology, materials, and labor.

Generally, the financial performance of a supply chain is assessed by considering the following items:

- Cost of raw materials.
- Revenue from goods sold.
- Activity-based costs like the material handling, manufacturing, assembling rates etc.
- Inventory holding costs.
- Transportation costs.
- Cost of expired perishable goods.
- Penalties for incorrectly filled or late orders delivered to customers.
- Credits for incorrectly filled or late deliveries from suppliers.
- Cost of goods returned by customers.
- Credits for goods returned to suppliers.

In short, we can say that the financial performance indices can be merged as one by using key modules such as activity based costing, inventory costing, transportation costing, and inter-company financial transactions.

4.2.2 SCOR Model

Q5. Discuss about SCOR Model.

Ans : **(Imp.)**

Introduction

- The Supply Chain Operations Reference model (SCOR) has been developed and endorsed by the Supply–Chain Council (SCC) as the cross-industry standard for supply chain management.
- The SCC was established in 1996 by Pittiglio Rabin Todd and McGrath (PRTM) and Advanced Manufacturing Research (AMR), and initially included 69 voluntary member companies.
- The SCC is an independent, not-for-profit, global corporation with membership open to all companies and organizations interested in applying and advancing state-of-the-art supply chain management systems and practices.
- All who use the SCOR-model are asked to acknowledge the SCC in all documents describing or depicting the SCOR-model and its use.
- All who use SCOR are encouraged to join the SCC, both to further model development and to obtain the full benefits of membership.
- The SCORmodel is still being developed the latest version of SCOR-model is numbered 7.0.
- SCOR is a management tool. It is a process reference model for supply-chain management, spanning from the supplier's supplier to the customer's customer.
- The SCOR-model has been developed to describe the business activities associated with all phases of satisfying a customer's demand. By describing supply chains using process building blocks, the model can be used to describe supply chains that are very simple or very complex using a common set of definitions.
- As a result, disparate industries can be linked to describe the depth and breadth of virtually any supply chain. The model has been able to successfully describe and provide a basis for supply chain improvement for global projects as well as site-specific projects.
- The first step the SCC made was to establish a standard vocabulary and a notation that could be used to describe any supply chain. Therefore the first step for a team that wants to use SCOR must be acquiring the same vocabulary, to assure they all talk about the same things in the same way.
- SCOR methodology assumes that all supply chain processes can be subdivided into one of five general subtypes: Plan, Source, Make, Deliver, and Return. Complex supply chains are made up of multiple combinations of these basic processes.
- SCOR also defines 3 levels of details (top, configuration and process element). In top the scope and content for the supply chain are defined, at the configuration level the company's supply chain is configured in order to company strategy, at the process element level there is a "fine tuning" of company's operations strategy and consists of process element definitions, inputs – outputs, process performance metrics, best practices.
- SCOR uses the historical data of the supply chain to see how it performs and develops, it defines five generic performance attributes and three levels of measures that the analysts can use.
- Once a company has a good understanding of the strengths and weaknesses of the As-Is process, they are in a good position to think about how they want to compete and what they will have to do to implement regardless from a supply chain strategy they choose.

Q6. Explain various levels of SCOR Model.

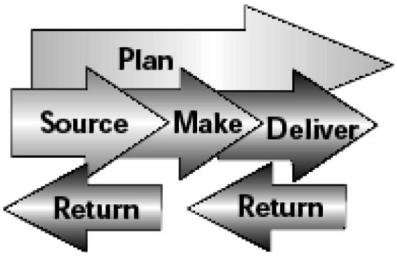
Ans :

SCOR analyzes a company's supply chain operation in three levels. The model is based on five different management processes. The processes Source, Make and Deliver of the company, together with those of clients and suppliers, form a "sup-

ply chain" planned as a whole by the different actors in the process Plan. Additionally in all the "contact links" Deliver-Source is included the process Return, for the management of returns.

Level 1: Top Level (Process Types)

At this level 1, companies using SCOR establish basic strategic objectives regarding their operations areas. Level 1 defines the scope and content for the Supply Chain Operations Reference-model. Here basis of competition performance targets are set.



(i) PLAN

- Processes that balance aggregate demand and supply to develop a course of action which best meets the established business rules.

  To plan the acquisition of prime matters in Source, to plan adequately the production in Make and to fulfil the clients requirements in the delivery in Deliver, it is necessary to be conscious of the demand's variability along the whole chain to avoid the unwanted effect Bullwhip (Accumulation of high inventory levels in the stages of the supply chain that are farer from the final client, which face great variability of demand in comparison with the distributors or retailers).

- For this is necessary to establish narrow relations with suppliers and clients to plan production in agreement to the demand of the final product. When the product is perishable, it is necessary to have a constant supply system.

- Every day it is necessary to have fresh inputs, necessary for the production of the day or the week.

- Likewise the capacity of the productive process must assure a volume adapted to satisfy the internal demand and that of exportation; as for the distribution, the deliveries must be focused to satisfy the delivery times, preserving the quality.

- Under these considerations arises the need to plan the production according to the different types of demand, for which is indispensable to share information in benefit of all the parts involved (from the supplier's supplier up to the client's client).

- However, for selected companies that produce raw ingredients and sell processed consumer products, such as dairy co-operatives, problems exist.

- Inventory planning assumes control of at least one end of the chain – either demand or supply. Inventory planning for agricultural businesses is very difficult. If a business can know exactly the quantity and quality of the harvest, the business can then plan the inventory that balances supply and demand. If not, the company quickly loses its ability to manage the chain optimally. The best it can achieve is sub-optimal performance.

(ii) SOURCE

- Processes that procure goods and services to meet planned or actual demand.

- The prime matters are an essential part to assure the quality of the final products. That's why quality standards must be established by the suppliers, to satisfy the final clients.

- However, the chain must recognise that uncontrollable events will affect the product procured. In the case of agricultural products, input quality variation can depend on environmental and biological factors (rain, disease, etc.).

- A vendor may have a contract, to clearly identify standards and be a certified supplier, but factors completely outside

of the vendor's ability to control, could result in a product delivered that doesn't match established parameters.

- The inputs can be divided in perishable products (ex: agricultural products) and not perishable (ex: packages). For the case of the perishable inputs, it is necessary that the supply interval is short to support a minimal inventory, the necessary quantity for the daily production.
- In this point it is very important to support a good coordination in the supply chain, with the purpose of avoiding from high costs of storage for concepts of refrigeration, or for caducity of prime matters.

(iii) MAKE

- Processes that transform goods to a finished state to meet planned or actual demand.
- In this process it is necessary to take into account all the activities of the transformation process from the raw material to the final product, as well as the flows of material and information of the productive process.
- When programming the activities of production process, it is necessary to have in mind that production is done according to request. Besides, to continuously improve the process, the preferences of the consumers must be considered.
- To satisfy these needs of the final client, methods and quality standards will be proposed in order to support the control of the productive process stepwise.

(iv) DELIVER

- Processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management and distribution management.
- To deliver the products, the volume that the client needs will be assured avoiding excessive deliveries, unnecessary costs of transport, etc.
- The clients portfolio will be defined. In this process it is managed from the questions and requirements of the clients up to the shipments of the product and the selection of logistic companies.

(v) RETURN

- Processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support.
- To do a good returns management and returns of raw material can be an important source of competitive advantages. It is necessary to assume that, in spite of the good practices to deliver a quality product, there can always be motives for which our products, or our prime matters, will be returned by the clients or to our suppliers respectively.
- Because of this, it is proposed to offer to the client an efficient service of management of returns, which allows to answer in time to this type of situations, minimizing a potential deterioration in the relation with the clients, and also to manage the process of returns with suppliers in case of receiving defective, expired or excessive inputs.
- There must be channels of communication and procedures properly studied to do this process, in such a way that this situation does not turn into an unexpected complaint, but it works as a good system of feedback in the post sale, with the objective of minimizing the costs of the return and at the same time, to be in good relations with clients and suppliers.

Level 2: Configuration Level (Process Categories)

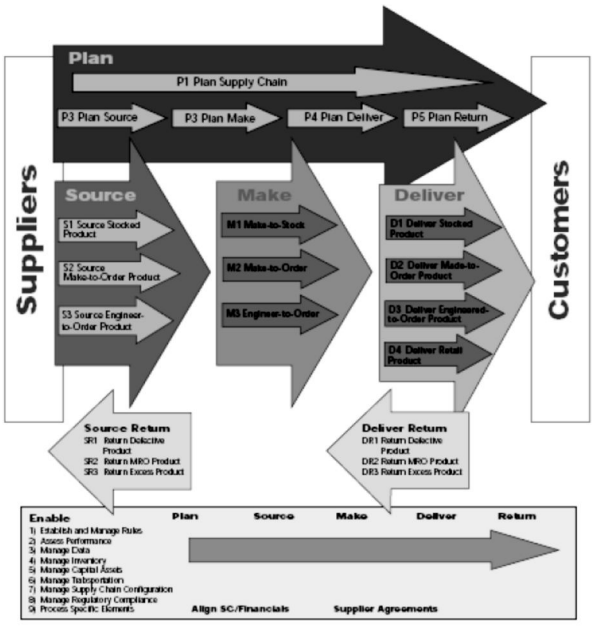
- In this level, companies configure their supply chain. A company's supply chain can be "configured-to-order" at Level 2 from 30 core "process categories."
- The Process Categories are defined by the relationship between a SCOR Process and a Process Type.

- The Process Categories are selected from the SCOR configuration toolkit, in agreement to the type of products and to the market, to represent the supply chain configuration. Each product or product type may have its own supply-chain.

"SCOR Configuration Toolkit"

		SCOR Process					
		Plan	Source	Make	Deliver	Return	
Process Type	Planning	P1	P2	P3	P4	P5	Process Category
	Execution		S1- S3	M1- M3	D1 - D3	R1-R3	
	Enablo	EP	ES	EM	ED	ER	

- The type of process Planning, consists of periodically aligning the necessary resources to get the requirements of demand in this one the demand, internal or for exportation, is agreed with the necessary supply for the production.
- The type Execution is unleashed by the current or planned demand; here the state of the materials is changed, and implies the transformation of the product, programming and sequencing the production. The type Enable corresponds to processes that prepare, support or handle information or relations on which depend the processes of Planning and Execution.



Level 3: Process Element Level (Decompose Processes)

In this level, detailed process element information for each level 2 process category is presented. Level 3 defines a company's ability to compete successfully in its chosen markets, and consists of :

- Process element definitions
- Process element information inputs, and outputs
- Process performance metrics
- Best practices, where applicable
- System capabilities required to support best practices
- Systems/tools

It is at this point where a company using SCOR will learn what information Inputs are needed for each of the Process Elements, and what Outputs to expect.

In this level, some considerations regarding the main processes should be:

(i) SOURCE

- It is recommended to have a differentiated treatment for the inputs and prime matters, according to their caducity. Hereby, agricultural products must have a political of inventory different from the packages, which can be stocked for more time. In this link of the chain, it is of great utility to use tools that allow the analysis of the provider companies, in order to identify their strengths and weaknesses, to establish the interrelationships between the links Source and Deliver in the best possible way. It is recommended the use of tools of strategic analysis of provider companies. Another important matter in this process, is the maintenance of the quality of the inputs and products along the whole chain, since for being foodstuffs, an efficient system of monitoring and control is needed.

(ii) MAKE

- In this level the information of the pro-

cess elements from levels 1 and 2 is presented in a more detailed way. For example, here would appear the flows of material of the process (Make), the sources of the income (Source) and the destinies of the products (Deliver). Here the phases of the process of production are taken into account stew, cooled, packed, etc. As well as the later phases: storage, freezing up to the distribution.

(iii) DELIVER

- It can also be taken in account if the management of the orders from different clients needs a different treatment: for example orders from normal clients or orders from retailers. With the last ones, the orders could be bigger, and as the capacity of production is limited and the times of delivery must be short, in that case, these orders should be reported with major fluency and anticipation. Also, it is necessary to know if the cool chain must be kept during the transport or not, to keep the quality of the final product, etc.

Q7. State strength and weakness of SCOR Model.

Ans : **(Imp.)**

Strengths

- Structured methodology for alignment of Strategic and Operational metrics and goals to identify business improvement opportunities
- Standardized Supply Chain process reference model and framework
- Standardized multi-level process performance metrics
- Industry and competitive benchmark data sources
- "Macro-level" approach for identification of improvement opportunities
- Level 1-3 material, work and information flow analysis
- " Source for best-in-class supply chain management practices
- " Identifies enabling IT capabilities to optimize the Supply Chain
- " Delivers a comprehensive opportunity and project portfolio with detailed ROI analysis

Weaknesses

- "Inadequate organization-wide training and development
- "Few analytical tools for cause effect analysis and problem solving at the "macro-level"
- "Inadequate tools, methodologies, or techniques to focus on executing projects identified by the SCOR efforts
- "Little programmatic infrastructure for organizing and managing concurrent project activities

4.2.3 Demand Chain Management

Q8. Discuss about Demand Chain Management.

Ans : **(Imp.)**

- Demand-chain management (DCM) It is the management of relationships between suppliers and customers to deliver the best value to the customer at the least cost to the demand chain as a whole.
- Demand-chain management is similar to supply-chain management but with special regard to the customers.
- Demand Chain Management software tools bridge the gap between the customer-relationship management and the supply-chain management.
- The organization's supply chain processes are managed to deliver best value according to the demand of the customers.
- DCM creates strategic assets for the firm in terms of the overall value creation as it enables the firm to implement and integrate marketing and supply chain management (SCM) strategies that improve its overall performance.

- A Demand-driven supply network (DDSN) It is one method of supply-chain management which involves building supply chains in response to demand signals.
- The main force of DDSN is that it is driven by customers demand. In comparison with the traditional supply chain, DDSN uses the pull technique. It gives DDSN market opportunities to share more information and to collaborate with others in the supply chain.
- DDSN uses a capability model that consist of four levels.
- The first level is Reacting, the second level is Anticipating, the third level is Collaborating and the last level is Orchestrating. The first two levels focus on the internal supply chain while the last two levels concentrate on external relations throughout the Extended Enterprise.
- In a demand-driven chain, a customer activates the flow by ordering from the retailer, who reorders from the wholesaler, who reorders from the manufacturer, who reorders raw materials from suppliers. Orders flow backward, up the chain, in this structure.
- Many companies are trying to shift from a build-to-forecast to a build-to-order discipline.
- The property of being demand-driven is one of degree: Being "0 percent" demand-driven means all production/inventory decisions are based on forecasts, and so, all products available for sale to the end user is there by virtue of a forecast.
- This could be the case of fashion goods, where the designer may not know how buyers will react to a new design, or the beverage industry, where products are produced based on a given forecast.
- A "100 percent" demand-driven is one in which the order is received before production begins. The commercial aircraft industry match to this description. In most cases, no production occurs until the order is received.

Competitive Advantages

To create sustainable competitive advantages with DDSN, companies have to do deal with three conditions:

- Alignment (create shared incentives)
- Agility (respond quickly to short-term change)
- Adaptability (adjust design of the supply chain)

Misconceptions

There are five commonly-made misconceptions of demand driven (DDSN):

Companies might think they are demand driven because they have a good forecast of their company.

- They have implemented lean manufacturing.
- They have great data on all their customers.
- They think it is a technology project and the corporate forecast is a demand visibility signal.
- They have a better view of customers demand.

An important component of DDSN is DDM ("real-time" demand driven manufacturing). DDM gives customers the opportunity to say what they want, where and when.

Demand Driven execution

- Demand-chain management is the same as supply chain management, but with emphasis on consumer pull vs. supplier push.
- The demand chain begins with customers, then funnels through any resellers, distributors, and other business partners who help sell the company's products and services.
- The demand chain includes both direct and indirect sales forces.

4.3 Global Supply Chain

Q9. Define Global Supply Chain. Explain the strategies of Global Supply Chain.

Ans : **(Imp.)**

In today's business era, "globalization is found to be offering many opportunities and challenges for both logistics and supply chain operations. Firms are expanding globally with an intention to minimize costs. In such a competitive environment, success can be achieved by identifying opportunities with the help of two vectors namely, cost-led productivity vector and customer-led/market-led vector. These opportunities include market expansion, product differentiations, human and material resources advantages. However, it should be noted that some regions of the world enable the firm to achieve significant economies of scale due to their competitive wage scales, while other requires expertise due to significant flexibility in those regions.

Strategies

Three of the ways in which businesses have sought to implement their global logistics strategies have been through focused factories, centralized inventories and postponement. These are looked at in more detail below:

1. Focused Factories

The idea behind the focused factory' is simple; by limiting the range and mix of products manufactured in a single location the company can achieve considerable economies of scale. Typically the nationally oriented business will have 'local-for-local' production, meaning that each country factory will produce the full range of products for sale in that country. On the other hand the global business will treat the world market as one market and will rationalize its production so that the remaining factories" produce fewer products in volumes capable of satisfying perhaps the entire market.

2. Centralization of Inventories

In the same way that the advent of globalization has encouraged companies to rationalize production into fewer locations so too has it led to a trend towards the centralization of inventories. Making use of the well-known statistical fact that consolidating inventory into fewer locations can substantially reduce total inventory requirement, organizations have been steadily closing national warehouses and amalgamating them into Regional Distribution Centres (RDCs) serving a much wider geographical area.

3. Postponement and Localization

Although the trend to global brands and products continues, it should be recognized that there are still significant local differences in customer and consumer requirements. Even within a relatively compact market like Western Europe there are major differences in consumer tastes and, of course, languages. Hence there are a large number of markets where standard, global products would not be successful.

Q10. Explain global supply chain strategies of organization with the help of examples.

(OR)

How do you think that a global supply chain can protect itself from disruptions due to natural/ manmade disasters? Justify your answers with suitable examples.

Ans : **(Imp.)**

In order to meet the global challenges and growing complexity of business, companies are adopting various global strategies. The following two example of key global organizations will help you to understand their situations and experiences in global business.

1. BestBuy

Best buy is a company which has changed its global supply strategy and product from a high-volume distribution process to a customer-facing operation. The following are the important changes that have been implemented directly to its supply chain.

(i) Higher Delivery Frequency and Smaller Shipments : The fast network preferably focus on distribution centers

that are situated very near to retail outlets. Today, imports from Asia have integrated in two large centers in California (i.e., in Seattle and Long Beach). These large centres supply the products to 7 large distribution centers and 14 small home delivery centers. When the efficient network transfers more loads to smaller facilities, the delivered loads will be ready for sales floor.

(ii) Greater Access to Information : Dispatchers and store associates possess necessary information regarding load status. For example, automatic alerts will be there which give alert about incidents such as delays in port. A new technology has been developed for predictive modeling. This technology stores information about past problems so that the solutions can be recalled when the similar problems occur in the future. Therefore, many managers use this information to implement proper corrective actions.

(iii) Better Forecasts : Best Buy has formed a consolidated product forecast by integrating the data from different partners and departments. This approach help the company to use 'one source of truth' instead of using the earlier situation which involved multiple forecasts.

Best Buy's followed the process of British super market Chain Tesco. The Tesco has proved to be an innovative source to Best Buy.

2. Tommy Hilfigher - Li and Fung

Tommy Hilfiger is the popular designer and marketer of casual fashions. The company sold its global sourcing group to Li & Fung, which is a buying agency for consumer goods in Hong Kong.

Tommy Hilfiger use to obtain all its materials from U.S., Hong Kong, India, Taiwan, Sri Lanka, Bangladesh, Tunisia and Honduras. It mainly shifted its sourcing operations to Li & Fung to occupy essential synergies with the present network of Li & Fung, which was well- established in China.

Tommy Hilfiger has taken this significant decision to its strategic sourcing need by means of out sourced solution. The company's operated buying offices has contributed significantly to the development of business. Now it will benefit more from the consolidation-of these offices under the network of Li & Fung, with over 70 offices in almost 40 countries and territories, including 19 offices in China alone.

4.3.1 Challenges in Establishing Global Supply Chain

Q11. Explain the Challenges in Establishing Global Supply Chain

Ans : **(Imp.)**

In recent years there have been very significant developments in the structure, organization and operation of logistics, notably in the interpretation of logistics within the broader supply chain. Major changes have included the increase in customer service expectations, the concept of compressing time within the supply chain, the globalization of industry - both in terms of global brands and global markets - and the integration of organizational structures. There are, in addition, a number of other influencing pressures that may provide an impact on a company's logistics system. These may be external to logistics, such as deregulation, or may indeed derive from changes within logistics, such as improved handling or information technology.

It is possible to view these different influences at various points (shown in figure aside) along the supply chain.

1. External Environment

One key influence that has become increasingly important in recent years has been the development of a number of different economic unions (the EU, ASEAN, NAFTA, etc). In some instances the formation of these unions may be felt to hold an important political element, but experience has shown that there will also be significant economic changes - most of these, hopefully, beneficial ones.

It is clear that one of the major consequences is deregulation within these internal markets, and this has a particular impact on companies' logistics strategies. Within the European Union there have been significant advances in, amongst others:

i) Transport deregulation.

ii) The harmonization of legislation across different countries.

iii) The reduction of tariff barriers.

iv) The elimination of cross-border customs requirements.

v) Tax harmonization.

Within logistics, this hds led many companies to reassess their entire logistics strategy away from a national approach to embrace a new cross-border/ non-national structure. There are many examples of companies that have significantly reduced depot numbers and associated inventory and storage costs whilst maintaining or improving customer service.

Another important development that has had a particular impact in Europe is the rise in importance of 'green' or environmental issues. This has occurred through an increasing public awareness of environmental issues, but also as a result of the activity of pressure groups. The consequences for logistics are important. They include:

i) The banning of road freight movements at weekends (Germany, Switzerland).

ii) The attempted promotion of rail over road transport.

iii) The recycling of packaging - sometimes referred to as reverse logistics.

iv) The 'greening' of products.

v) The outsourcing of reverse logistics flows.

vi) The design of products to facilitate repair/refurbishment, recycling and the elimination of packaging.

For most cities throughout the world one very visible external impact is that of road congestion. The fact of severe traffic congestion may well have a very negative effect on some of the new concepts in logistics - in particular the idea of JIT and quick-response systems. Allied to this problem is that most forecasts predict a significant increase in vehicle numbers at a time when, in most countries, there are very limited road-building programmes. Many Western countries try to reduce congestion through a combination of road tolls, lorry bans, access restrictions, time restrictions and usage tax - all of which have an impact on logistics costs ar performance. There is no generally accepted solution. Companies try to alleviate the problem through strategies such as out-of-hours deliveries, stocMess' -depots and depot relocation closer to delivery points.

The extreme changes and developments in logistics thinking and logistics and information technology has a' ' led to another issue the impact that this has on the availability of suitable management and labor.

The need for a strategic view of logistics and the need for an appropriate understanding of the integrated nature of logistics are both important for today's supply-chain-oriented networks. Many managers do not have the relevant experience or knowledge that provides this view. Add to this the rapid changes in technology, and it is understandable why there is such a shortage of suitable logistics management. This problem is also reflected in the quality of labor available to work in the many different logistics and distribution functions.

2. Supply

There have been many important developments in supply or inbound logistics. These have resulted - from both technological and organizational changes. Within the context of raw material sourcing and production these include:

i) Manufacturing Technology (CIM, etc.): It can accommodate more complex production requirements and more product variations.

ii) New Supplier Relationships with the emphasis on single sourcing and lean supply, thus enabling suppliers and buyers to work more closely.

iii) Focused Factories: With a concentration on fewer sources but necessitating longer transport journeys.

iv) Transnational Sourcing: It emphasizes the move away from local or national sources to a more global strategy.

v) **Postponement:** Where the final configuration of products is delayed to enable reduced stock-holding of finished goods in the supply chain.

vi) **Co-Makership:** The development of partnerships between supplier and buyer to help take costs out of the supply chain through quality and information improvements. This represents a positive move away from the more traditional adversarial relationship that has been common between buyers and suppliers.

vii) **Co-Location:** The joint physical location of supplier operations on or next to customer production sites.

viii) **Extended Lead Times of Supply:** The consolidation of global production into a single or a limited number of manufacturing sites creates contention in terms of the demands of the various markets, possibly requiring local product variations. Manufacturing management have tended to impose long lead times under the mis-guided assumption that long lead times provide a buffer against the competing demands of different customers. Leading edge practice shows that the imposition of long manufacturing lead times is a largely artificial constraint. In many cases it should be possible to make to order on very short timescales for specific customers in contrast to supplying from inventory.

3. Distribution

In many ways, there have been fewer changes in the distribution elements of the supply chain than in most of the other elements. In an operational context the major developments have been technology based:

i) New' vehicle systems - demountable bodies, etc.

ii) Stockless depots operating cross-docking arrangements.

iii) Paperless information systems, particularly in depots.

iv) Interactive routing and scheduling for road transport operations.

An important and still expanding area is that of third-party distribution, or the outsourcing of distribution operations. This has been a significant feature of logistics in the UK for many years, and now many continental European countries have begun to follow the same track. The major advantage is that outsourcing allows a company to specialize in its own core business, be it manufacturing or retailing, without spreading its resources to cover distribution as well.

4. Extended and Unreliable Transit Times

The use of sea freight can represent considerable investment in inventory on the high seas; it also seriously constrains the application of the basic logistics principle of postponement, i.e., delay shipping decisions until the last possible moment.

Increasingly it is the case that as true supply chain costs become more clearly understood the use of air freight is growing. Such are the penalties of high inventories and inflexible response to marketplace needs that the trade-off will increasingly swing towards shorter transit times and hence swifter transit modes.

5. Multiple Consolidation and Break Bulk Options

The options for the management of international freight is several and the trade-offs will be complex and may vary for different product/marke channels.

They can be summarized under four main headings:

i) Direct ship from each source to final market in full containers.

ii) Consolidate in the supply region for final market in full containers.

iii) Consolidate from each source for each theatre of operation with break bulk/intermediate inventory in the theatre for specific markets.

iv) Consolidate in the supply region and also break bulk in the theatre of operations.

Obviously the inventory holding, warehousing, customer service and freight costs balance will be different for each of these and will be determined by the characteristics of the product and the profile of demand.

6. Multiple Freight Mode and Cost Options

Shipping companies offer mixed sea/air services, different container sizes, scheduled and unscheduled services, the extended lead times involved in long sea passages are forcing companies to use air freight to an extent which appears costly but which, in the context of inventory holding costs, potential lost revenue and market flexibility, may be a worthwhile expense.

7. Retailing

As retail sector opens up on a huge scale, logistics companies are planning significant investments to expand their portfolio of services. It is expected that in the next two years, the logistics sector will have undergone major changes, offering a wide spectrum of services, players in the logistics space are keenly tracking these developments, as they suddenly find their services in big demand. Players in the segment are, indeed, ramping up their capital expenditure programme. The companies plan to expand their service portfolios. The different sectors within the logistics segment are also poised to absorb significant investments. The logistics companies at present provide services from transportation to warehousing and inventory management. But, in the near future, they will have to expand their products basket to include new value-added services, such as packaging, labelling and reverse logistics. The biggest challenge that faces these companies is that they should quickly imbibe latest technologies, such as GPC/GIS tracking of consignments, and uncork new services to cater to corporates seeking to outsource their logistics needs.

8. Consumer

he challenge is to provide the consumer with better value in return for their dollar. While the firm may see global sourcing as a means to reduce material or component costs, the only value that is relevant for consumers is a reduction in total landed cost while also considering such elements as quality and post sales support. Manufacturers need to make sure that their decisions to reduce sourcing costs also continue to provide the best overall value to consumers.

Q12. What are the major differences between Global Supply Chain and Domestic Supply Chain?

Ans : **(Imp.)**

The growth in world trade has continued to outstrip growth in most countries Gross National Product throughout the closing years of the 20th century and looks set to continue for the foreseeable future. In part this trend is driven by expanding demand in new markets but also the liberalization of international trade through GATT/WTO accords has had a significant effect.

Once, companies established factories in overseas countries to manufacture products to meet local demand. Now, with the reduction of trade barriers and the development of global transportation infrastructure, fewer factories can produce in larger quantities to meet global, rather than local, demand.

1. Performance-Cycle Length

- The performance-cycle length is the major difference between domestic and global operations. Instead of three to five-day transit times and four-to ten-day total performance cycles, global operations often require performance cycles measured in terms of weeks or months.
- The reasons for a longer performance cycle are communication delays, financing requirements, special packaging requirements, ocean freight scheduling, long transportation times, and customs clearance. Communication is delayed by time zone and language differences.
- Financing causes delays since most international trade requires letters of credit. Special packaging requirements are necessary to protect products from handling and water damage since containers often incur high humidity' levels from temperature and weather conditions.
- The longer performance cycle also results in higher inventory requirements because significant product is in transit at any point in time.

- This requires continuous evaluation of inventory and space requirements while awaiting arrival and clearance of international shipments.

2. Operations

There are a number of major differences that must be considered when operating in a global environment.

- **First:** International operations require multiple languages for both product and documentation.
- A technical product such as a computer or a calculator must have local characteristics such as keyboard characters and language on both the product itself and the manual. From a logistics perspective, language differences dramatically increase complexity since a product is limited to a specific country once it has been customized with respect to language.
- Although product proliferation due to language requirements has been reduced through multilingual packaging, this is not always an acceptable strategy.
- In addition to product language implications, international operations require multilingual documentation for each country' that the shipment passes through. Although English is the general language of commerce, some countries require that transportation and customs documentation be provided in the local language.
- This increases the time and effort for international operations since complex documents must be translated prior to shipment. These communication and documentation difficulties can be overcome through standardized EDI transactions.
- **The second:** Operating difference is the increased number of products necessary to support global operations. This is partially due to the language differences. However, there may also be differences intrinsic to the product itself such as performance features, power supply characteristics, and safety requirements. While they may not be substantial, the small differences between country requirements may significantly increase required stockkeeping units (SKUs) and subsequent inventory levels.
- **The third:** Operating difference is the sheer amount of documentation required for international operations.
- While domestic operations can generally be completed using only an invoice and bill of lading, international operations require substantial documentation regarding order contents, transportation, financing, and government control.

3. Systems Integration

- Historically, international information systems in multinational enterprises have shown little commonality.
- This was acceptable since each country's operation was viewed as a separate and autonomous legal entity. While this strategy provides local responsiveness and flexibility, the subsequent cost of poor inter country coordination may be prohibitive in competitive terms.
- Therefore, the third global supply chain operating difference is the requirement for increased operational coordination through systems integration.
- This includes the ability to route orders and manage inventory requirements using EDI from any place in the world. Since new hardware and software represent substantial capital investment, this is not a short-term change. Few enterprises have integrated global logistics information systems

4. Alliances

- The fourth difference iri international operations is the role of alliances.
- While alliances with carriers and specialized sendee suppliers are important for domestic operations, they become even more important internationally.

- Without alliances, it would be necessary for an enterprise operating internationally to maintain contacts with retailers, wholesalers, manufacturers, suppliers, and service providers throughout the world.
- The simple maintenance of these relationships alone would be time consuming. International alliances can provide market access and expeitise as well as reduce the inherent risk in global operations.

4.3.2 Factors that influence Designing Global Supply Chain Network

Q13. What are the factors influence Designing Global Supply Chain Network?

Ans : **(Imp.)**

- Globalization offers companies opportunities to simultaneously grow revenues and decrease costs
- The opportunities from globalization are often accompanied by significant additional risk
- There will be a good deal of uncertainty in demand, prices, exchange rates, and the competitive market over the lifetime of a supply chain network
- Therefore, building flexibility into supply chain operations allows the supply chain to deal with uncertainty in a manner that will maximize profits.

Risk Factors	Percentage of Supply Chain Affected
Natural disasters	35
Shortage of skilled resources	24
Geopolitical uncertainty	20
Terrorist infiltration of cargo	13
Volatility of fuel prices	37
Currency fluctuation	29
Port operations/custom delays	23
Customer/consumer preference shifts	23
Performance of supply chain partners	38
Logistics capacity/complexity	33
Forecasting/planning accuracy	30
Supplier planning/communication issues	27

Designing Supply Chain Network for each industry or business involves arriving at a satisfactory design framework taking into all elements like product, market, process, technology, costs, external environment and factors and their impact besides evaluating alternate scenarios suiting your specific business requirements. No two supply chain designs can be the same. The network design will vary depending upon many factors including location and whether you are looking at national, regional or global business models.

1. Supply Chain Network in Simple and basic Terms Involves determining following process design

Procurement

- Where are yoursuppliers
- How will you procure raw materials and components

Manufacturing

- Where will you locate the factories for manufacturing/assembly
- Manufacturing Methodology

Finished Good

- Where will you hold inventories, Number of Warehouses, Location of warehouses etc.
- How will you distribute to markets - Transportation and Distribution logistics

All above decisions are influenced and driven by Key Driver which is the Customer Fulfillment.

2. Designing Supply Chain Network involves determining and defining following Elements

- Market Structure
- Demand Plotting or Estimation

3. Market Segment

- Procurement Cost
- Product /Conversion Costs
- Logistics Costs including Inventory holding costs
- Overheads
- Cost of Sales

4. Network Design aims to define

- Best fit Procurement model - Buying decision and processes- VMI, JIT, Kanban, procurement cost models etc.
- Production processes - One or more number of plants, plant capacity design, Building to order, build to stock etc, in-house manufacturing or outsource manufacturing and related decisions including technology for production.
- Manufacturing Facility design - Location, Number of factories, size of unit, time frames for the plant setup project etc.
- Finished Goods Supply Chain network - Number of warehouses, location & size of warehouses, inventory flow and volume decisions, transportation.
- Sales and Marketing Decisions - Sales Channel and network strategy, Sales pricing and promotions, order management and fulfillment process, service delivery process definitions.

5. Network Design also examines

- Derives cost estimates for every network element
- Examines ways to optimize costs and reduce costs
- Extrapolates cost impact over various product lines and all possible permutations and combinations to project profitability

6. Some of the key factors that affect the supply chain network modelingare

- Government Policies of the Country where plants are to be located.
- Political climate
- Local culture, availability of skilled / unskilled human resources, industrial relations environment, infrastructural support, energy availability etc.
- Taxation policies, Incentives, Subsidies etc across proposed plant location as well as tax structures in different market locations.
- Technology infrastructure status.
- Foreign investment policy, Foreign Exchange and repatriation Policy and regulations.

Supply Chain Network designs not only provide an operating framework of the entire business to guide the managements, they also examine the structure from strategic view point taking into account external influences, interdependencies of all processes and critically evaluate opportunities to maximize profitability.

Supply Chain Design consultants use various design softwares and optimization techniques coupled with inputs from industry consultants and experts.

Short Question and Answers

1. Bullwhip Effect.

Ans :

The bullwhip effect on the supply chain occurs when changes in consumer demand causes the companies in a supply chain to order more goods to meet the new demand. The bullwhip effect is a distribution channel phenomenon, rather problem, in which demand forecasts yield supply chain inefficiencies.

2. What is performance measurement?

Ans :

- Performance measurement is the process used to assess the efficiency and effectiveness of projects, programs and initiatives.
- It is a systematic approach to collecting, analyzing and evaluating how "on track" a project/ program is to achieve its desired outcomes, goals and objectives.
- Performance measurement is typically done by an organization to demonstrate accountability, support decision making and improve processes.
- It is not an approach that prescribes what must be measured; organizations need to develop their own performance measures based on their project plans and situation.
- Performance measurement should be treated as an integral part of any planning process from the outset and should be built into any plan or project that has clear goals and objectives.

3. Cycle Time.

Ans :

Cycle time is often called the lead time. It can be simply defined as the end-to-end delay in a business process. For supply chains, cycle time can be defined as the business processes of interest, supply chain process and the order-to-delivery process. In the cycle time, we should learn about two types of lead times.

They areas follows:

- Supply chain lead time
- Order-to-delivery lead time

The order-to-delivery lead time can be defined as the time of delay in the middle of the placement of order by a customer and the delivery of products to the customer. In case the item is in stock, it would be similar to the distribution lead time and order management time. If the ordered item needs to be produced, it would be the summation of supplier lead time, manufacturing lead time, distribution lead time and order management time.

4. Resource Utilization.

Ans :

In a supply chain network, huge variety of resources is used. These different types of resources available for different applications are mentioned below.

- **Manufacturing Resources:** Include the machines, material handlers, tools, etc.
- **Storage Resources:** Comprise warehouses, automated storage and retrieval systems.
- **Logistics Resources:** Engage trucks, rail transport, air-cargo carriers, etc.
- **Human Resources:** Consist of labor, scientific and technical personnel.
- **Financial Resources:** Include working capital, stocks, etc.

5. Strengths of SCOR Model.

Ans :

- Structured methodology for alignment of Strategic and Operational metrics and goals to identify business improvement opportunities
- Standardized Supply Chain process reference model and framework
- Standardized multi-level process performance metrics

- Industry and competitive benchmark data sources
- "Macro-level" approach for identification of improvement opportunities
- Level 1-3 material, work and information flow analysis

6. Weaknesses of SCOR Model.

Ans :

- "Inadequate organization-wide training and development
- "Few analytical tools for cause effect analysis and problem solving at the "macro-level"
- "Inadequate tools, methodologies, or techniques to focus on executing projects identified by the SCOR efforts
- "Little programmatic infrastructure for organizing and managing concurrent project activities

7. Define Global Supply Chain.

Ans :

In today's business era, "globalization is found to be offering many opportunities and challenges for both logistics and supply chain operations. Firms are expanding globally with an intention to minimize costs. In such a competitive environment, success can be achieved by identifying opportunities with the help of two vectors namely, cost-led productivity vector and customer-led/market-led vector. These opportunities include market expansion, product differentiations, human and material resources advantages. However, it should be noted that some regions of the world enable the firm to achieve significant economies of scale due to their competitive wage scales, while other requires expertise due to significant flexibility in those regions.

8. Performance-Cycle Length.

Ans :

- The performance-cycle length is the major difference between domestic and global operations. Instead of three to five-day transit times and four-to ten-day total performance cycles, global operations often require performance cycles measured in terms of weeks or months.
- The reasons for a longer performance cycle are communication delays, financing requirements, special packaging requirements, ocean freight scheduling, long transportation times, and customs clearance. Communication is delayed by time zone and language differences.

Choose the Correct Answer

1. The objective of performance measure is to achieve a _____. [c]
   (a) Benchmark (b) Perfect distribution
   (c) Perfect order (d) Goal
2. The purpose of _____ is to arrive at a realistic projection of demand patters across different market and for different product lines. [a]
   (a) Demand forecasting (b) Speculation
   (c) Logistics (d) Supply chain management
3. Buying according to the requirements is called _____. [d]
   (a) Seasonal Buying (b) Scheduled Buying
   (c) Tender Buying (d) Hand to mouth buying
4. The _____ Forecasting approach is a decentralized approach. [d]
   (a) Demand (b) Trend
   (c) Supply (d) Bottom up
5. _____ comprises of raw materials, components, and fuels, etc. which are required to facilitate manufacturing operations. [a]
   (a) Raw material inventory (b) Work in process inventory
   (c) Finished goods inventory (d) Average inventory
6. The flow of information that facilitates co-ordination activities is [b]
   (a) Forward information flow (b) Backward information flow
   (c) Upward information flow (d) Downward information flow
7. Unreliability of vendors leads to [d]
   (a) Production uncertainty (b) Process uncertainty
   (c) Demand uncertainty (d) Supply uncertainty
8. The internal process leads to [b]
   (a) Production uncertainty (b) Process uncertainty
   (c) Demand uncertainty (d) Supply uncertainty
9. The upstream supply chain is: [b]
   (a) Exclusively inside an organization
   (b) Involved with procurement of material from suppliers
   (c) The distribution of products or delivery of services to customers
   (d) Both the first and third answer
10. The downstream supply chain is: [d]
   (a) Exclusively inside an organization
   (b) Involved with procurement of material from suppliers.
   (b) the distribution of products or delivery of services to customers
   (c) both the first and third answer above

Fill in the blanks

1. The _____ effect on the supply chain occurs when changes in consumer demand causes the companies in a supply chain to order more goods to meet the new demand.
2. _____ measures provide the information to assist in making strategic decisions about what an organization does and how it performs.
3. _____ measures is the assessments used to measure the performance, and compare or track the performance or products.
4. Cycle time is often called the _____.
5. The _____ level in a supply chain is marked as an operation of multiple unique performance indices.
6. SCOR stands for _____.
7. DCM stands for _____.
8. DDSN stands for _____.
9. _____ sector opens up on a huge scale, logistics companies are planning significant investments to expand their portfolio of services.
10. The metrics of _____ measures comprise cycle time, customer service level, inventory levels, resource utilization ability to perform, flexibility, and quality.

ANSWERS

1. Bullwhip
2. Performance
3. Quantitative
4. Lead time
5. Customer service
6. The Supply Chain Operations Reference Model
7. Demand Chain Management
8. Demand-driven Supply Network
9. Retail
10. Non-financial

Very Short Questions and Answers

1. Define Global Supply Chain Strategy.

Ans :

A global supply chain strategy acts as an effective tool in expanding the business by combining the objectives of various firms located in different countries, thereby helps in reducing the risk and increasing the profitability of firms.

2. List out the forces driving firms to enter a global arena.

Ans :

The following are the forces driving firms to enter a global arena,

(i) Economic growth

(ii) Regionalization

(iii) Technology

(iv) Deregulation

3. What do you mean by the concept Interlinked Global Economy?

Ans :

The global economy are highly interconnected by the logistical systems, capacity of manufacturers, suppliers of materials, markets etc.

4. What do you understand by Global Alliance?

Ans :

Global alliances are the ones that provide market access, minimizes the international risk and offers expertise in global operations.

5. Define the term Franchising.

Ans :

Franchising is a special type of licensing wherein franchiser is not only responsible for providing marketing and operations management programmes, but also provides inputs of the processes so that a franchiser can have a "bird's eye approach" on the entire operating mechanism of a franchisee.

UNIT V

Coordination in a Supply Chain: Importance of Coordination, Lack of Supply Chain Coordination and the Bullwhip Effect, Obstacles to Coordination, Managerial Levels, Building Partnerships and Trust, Continuous Replenishment and Vendor Managed Inventories, Collaborative Planning, Forecasting and Replenishment. Role of Information Technology in Supply Chain, Supply Chain 4.0.

5.1 Coordination in a Supply Chain

Q1. Define Coordination. Explain various levels of coordination in supply chain management.

Ans : **(Imp.)**

- Supply chain management (SCM) is concerned with the management of material, information, and financial flows in a network consisting of suppliers, manufacturers, distributors, and customers.
- Coordination and integration of these flows within and across companies are critical in effective supply chain management.
- The main question is how coordination in a supply chain can be achieved. The state of coordination in a supply chain can be understood as an act of properly combining (relating, harmonizing, adjusting, aligning) a number of objects (actions, objectives, decisions, information knowledge, funds) for the achievement of the chain goal.
- Lack of coordination in supply chain leads to deterioration of service and increase the cost within supply chain. So, coordination is necessary for supply chain.
- 'In supply chain, one achieves the coordination at two levels:

  1. Inter-Functional Coordination and
  2. Inter-Corporate Coordination.

1. Inter-Functional Coordination

- As a firm begins to divide labor and seek specialization among organizational members, it is necessary to make certain that everyone continues to work toward the common goals of the organization.
- Thus, coordination and control of actions among firm members become imperative. Inter-functional coordination is important because the overall tasks and goals of the organization are rarely functional. For example, the creation of value for customers is a common goal that any individual in any function in a firm can potentially contribute to.
- As such, inter functional coordination within a firm is a must in supply chain management where there are common goals of improving the long-term performance of the individual companies and the supply chain as a whole.
- Inter-functional coordination can be defined as working together across functions or departments. Within a particular firm inter-functional coordination can be defined as the coordinated efforts across functions to accomplish common goals, such as creating customer value and responsiveness to market changes, under close relationships among the functions.

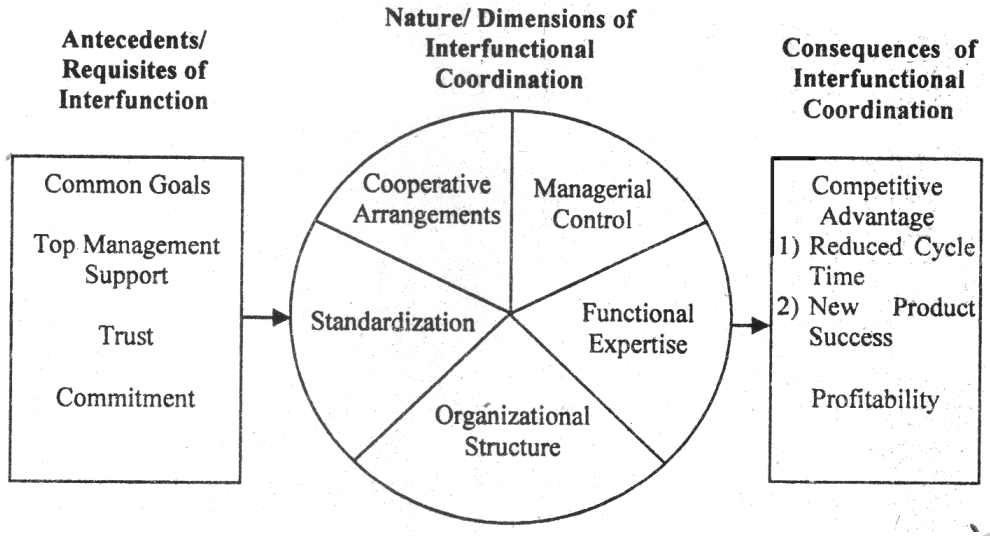


Fig.: An Integrated Model of Inter-Functional Coordination

Requisities

i) Common Goals: Common or integrated goals refer to establishing joint or mutual goals and performance measures between two different functions. Achievement of the company's goals requires extensive cross-functional coordination, which may be difficult when functional departments think narrowly in terms of their own functional goals.

Common goals affect the relationship between functional areas and sub-units within organizations. In an empirical study of members of the Council of Logistics Management (CLM), Murphy and Poist found that the lack of perceived benefits is a key obstacle to inter-functional coordination between marketing and logistics. In other words, without pre-established goals that fulfill common interests of different functions, inter-functional coordination will not succeed.

A way of establishing common goals is incentive systems that involve the sharing of benefits and risks between different functions for any cooperative efforts as well as incorporate greater goal integration. In addition, goal integration should reduce the incidence of coercive influence attempts by increasing functional inter-dependence and, therefore, the need to cooperate.

i) Trust and Commitment: The informal relations are central to the real work of organizations. They argue that internal partnering among personnel from different functional areas requires trust and commitment. The beliefs of managers about the trustworthiness of peers can be measured along two dimensions, the extent of affect-based trust and the extent of cognition-based trust, and some level of cognition-based trust is necessary for affect-based trust to develop. They can be further defined by McAllister as:

i) Cognition-Based Trust: It is grounded in individual beliefs about peer reliability and dependability.

ii) Affect-Based Trust: It is grounded in reciprocated interpersonal care and concern.

The study results further indicate that the affective foundations are essential for interpersonal trust, and affect-based trust facilitates effective coordinated action in organizations.

ii) Top Management Support: Murphy and Poist report that the top management support is one of the most important and most frequently used techniques to encourage inter-functional coordination. Similarly, Hodge argue that integrating the activities, tasks, and sets of tasks performed throughout

the organization into a coordinated whole is the primary responsibility of management. Leaders differentiate tasks, group employees together, and integrate work so that the organization can conduct itself in a smooth and seamless manner.

2. Inter-Corporate Coordination

- Inter-corporate coordination is the second level of coordination in the supply chain. In this, firm develops cooperation or alliances from outside parties or firms to improve its efficiency. Inter-corporate coordination is simply a coordination betweens various corporate or firms.
- According to Gulati, "Inter-corporate coordination/alliances encompass a variety of agreements whereby two or more firms agree to pool their resources to pursue specific market opportunities".
- Gulati argues that perhaps the most significant manifestation of the rise in inter-firm cooperation has been the dramatic increase in inter-firm strategic alliances.
- The strategic partnership between any two firms, whether it is between buyer and seller or manufacturer and carrier, could be a segment of an extended supply chain. This is so because each partner in a strategic alliance, which is a primary cooperative strategy, brings knowledge and/or resources to the partnership.
- To maintain long-term cooperation, repeated sequential communications, decisions, and negotiations must take place. In other words, a "supply chain" is a set of firms among which cooperation may take place.

Reason

- The fierce competition in today's markets is led by advances in industrial technology, increased globalization, tremendous improvements in information availability, plentiful venture capital and creative business designs. In highly competitive markets, the simple pursuit of market share is no longer sufficient to ensure profitability and, thus, companies focus on re-defining their competitive space or profit zone.
- **For example,** companies pursue cooperative relationship to capture lifetime customer share rather than mass market share through systematic development and management of cooperative and collaborative partnerships.

1. Power Shifts from Corporate Buyers to End-Users

Power in a broad spectrum of channels has shifted downstream toward the customer or (end) user; as a result, customer satisfaction becomes the ultimate goal of a firm. As the customer increasingly is in charge in the marketplace, inter-firm cooperation is critical to satisfy customers. Manufacturers and their intermediaries must be nimble and quick or face the prospect of losing market share; thus, relationships and predictable performance become very important in a supply chain.

2. Mass Customization

Mass customization is a new way of viewing competition for both manufacturing and service industries, and mass customization at its core provides a tremendous increase in variety and customization without .sacrificing efficiency, effectiveness, or low costs. In other words, customers want it all i.e., low cost with high levels of service, and customization with availability; mass customization can be achieved only through the committed involvement of employees, suppliers, distributors, retailers, and end customers.

3. Globalization

Firms are competing in a global economy and thus, the unit of business analysis is now the world, not just a country or region. The communications revolution and globalization of consumer culture will not tolerate hand-me-down automobile designs or excessive delivery times.

According to Kotler, "As firms globalize, they realize that no matter how large they are, they lack the total resources and requisites for success. Viewing the complete supply chain for producing value, they recognize the necessity of partnering with other organizations".

4. Time and Quality-Based Competition

Time and quality-based competition focus on eliminating waste in the form of time, effort, defective units, and inventory in manufacturing-distribution systems. In addition, there has been a significant trend to emphasize quality, not only in the production of products or services but also throughout all areas in a company.

5.1.1 Importance of Coordination

Q2. Explain the importance of coordination in supply chain management.

Ans : **(Imp.)**

The following are some important aspects of coordination in SCM:

1. **Information Sharing:** Effective information sharing between different stages of the supply chain helps in better decision making and reduces uncertainty.
2. **Communication:** Effective communication between suppliers, manufacturers, distributors, and customers is crucial for successful coordination of the supply chain.
3. **Collaboration:** Collaboration between different stages of the supply chain can lead to increased efficiency, improved quality, and reduced costs.
4. **Inventory Management:** Coordination of inventory levels between different stages of the supply chain helps to balance the trade-off between inventory costs and stockouts.
5. **Transportation Management:** Coordination of transportation activities, such as routing and scheduling, helps to optimize transportation costs and improve delivery times.
6. **Performance Management:** Performance metrics and targets should be established and monitored to evaluate the performance of the supply chain and identify areas for improvement.
7. **Contract Management:** Contracts between different stages of the supply chain should be effectively managed to ensure that all parties meet their obligations.

5.1.2 Lack of Supply Chain Coordination

Q3. Explain the various causes lack of supply chain coordination.

Ans :

- When all stages in the supply chain take actions together, it usually results in greater total supply chain profits.
- SC coordination requires that each stage take into account the effects of its actions on the other stages.
- Supply chain variability can be caused due to:
  - lack of information sharing and visibility in the supply chain.
  - lack of supply chain coordination and integration.
  - inability to adapt to events in real time..
  - inability to fully figure out the immediate and future impact of planned actions..
  - local optimisation of parts of the supply chain.
  - poor planning..
  - lack of process and quality control
  - unexpected delays in the supply process
- The lack of supply chain coordination can result in following effects:
  - Large demand and supply fluctuations result in the need for high inventories to prevent stock-outs..
  - Poor customer service as all demand might not be met..
  - Production scheduling and capacity planning becomes difficult due to large order changes..

- Extra manufacture expansion to meet peak demand.
- High costs for large unexpected orders..
- Expedited shipments and overtime.
- Conflict between supply chain players

5.2 THE BULLWHIP EFFECT

Q4. Explain the concept of bull-whip effect in SCM.

Ans : **(Imp.)**

Bull-whip Effect

The phenomenon of increase in the demand or order variability across the supply chain while moving upwards i.e., from customers to manufacturers is termed as "bull-whip effect".

In case of products with stable demand the retail sales will remain constant but there has been an increase in fluctuations in order quantities placed by distributors and wholesalers and manufacturers which resulted in increase in inventory and back order levels in a supply chain.

Example

Phenomenon of bull-whip effect can be better understood by studying the demand fluctuation for pampers of "proctor and gamble". These products have stable demand and have high fluctuations in orders from distributors, wholesalers and manufacturers than retail sales.

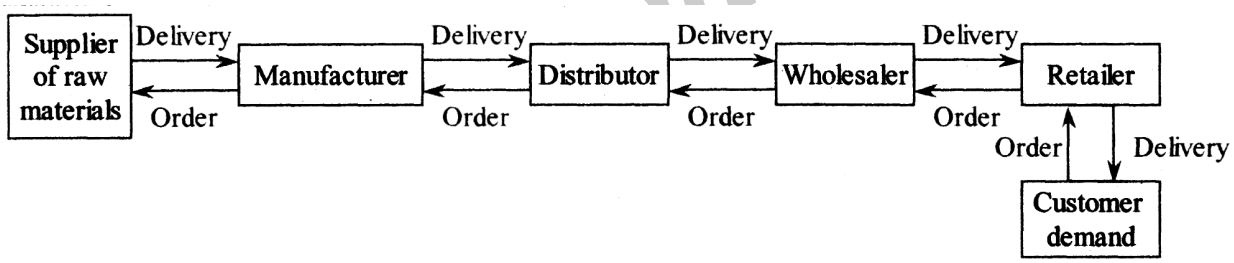


Fig.: Simple Supply Chain

In this supply chain, the retailer places an order to the wholesalers for the products based on the demand forecasts. Wholesaler then places an order to distributors who in turn receive goods from the manufacturer.

Q5. What are the various methods through which impact of bull-whip effect can be reduced?

Ans :

The impact of bull-whip effect on firm's operations can be reduced to a great extent use by making anyone of the following methods as follows,

(a) Minimizing uncertainty

(b) Minimizing variability of consumer demand

(c) Minimization of lead times

(d) Strategic partnerships.

(a) Minimizing Uncertainty

Firm can reduce the bull-whip effect by reducing uncertainty with the help of supply chain by centralizing the demand information among all the supply chain members or at any stage of supply chain. Therefore, the firms can reduce uncertainty with the help of centralizing the demand information. The centralized data helps in the use of single inventory policy. Single forecasting method, pricing strategies and so on, there still exists bull whip effect. Thus, it is clear that reducing uncertainty through centralization of information cannot eliminate the bull whip effect but can reduce it's impact greatly on the firm's operations.

(b) Reducing Variability of Consumer Demand

Firm can reduce the bull-whip effect by reducing the variations in the consumer demand process. Eventhough, the bull-whip effect reduces the variations in consumer demand it can also reduce the variations in demand at any stage of supply chain.

Example

A firm can reduce consumer demand variations using Every Day Low Price (EDLP) strategy i.e., maintaining low prices and reducing price promotions. This method can eliminate the variations in demand pattern which leads to maintaining consistent demand thereby reducing the bull whip effect.

(c) Minimization of Lead Time

Lead time has a significant impact on demand estimation variability. Increase in lead time leads to significant increase in order quantity variability across the supply chain. Thus, firm should reduce the lead times in order to reduce the impact of bull-whip effect. Lead times can be reduced by managing it's components such as,

(i) Order lead time for shipment can be managed or reduced through cross-docking.

(ii) Information lead time for order processing can be reduced through electronic data interchange.

(d) Strategic Partnerships

Strategic partnerships can reduce the impact of bull-whip effect on firm's operations. Strategic partnerships provide different ways of information sharing and inventory management across the supply chain which can reduce the demand variability.

Example

Firms by using Vendor Managed Inventory (VMI) can reduce the impact of bull-whip effect by managing the inventory based on their own estimates and demand forecasts but not on the retailer.

5.2.1 Obstacles to Coordination

Q6. Discuss various obstacles to coordination in the supply chain management.

Ans : **(Imp.)**

Any factor that leads to either local optimization by different stages of the supply chain or an increase in information delay, distortion, and variability' within the supply chain, is an obstacle to coordination. One divides the major obstacles into five categories:

1. Incentive Obstacles

Incentive obstacles refer to situations where incentives offered to different stages or participants in a supply chain lead to actions that increase variability and reduce total supply chain profits.

i) **Local Optimization within Functions or Stages of a Supply Chain:** Incentives that focus only on the local impact of an action result in decisions that do not maximize total supply chain profits.

For example, if a transportation manager at a firm has her compensation linked to the average transportation cost per unit, she is likely to take actions that lower transportation costs even if they increase inventory costs or hurt customer service. It is natural for any participant in the supply chain to take actions that optimize performance measures along which they are evaluated.

ii) **Sales Force Incentives:** Improperly structured sales force incentives are a significant obstacle to coordination is the supply chain. In many firms, sales force incentives are based on the amount the sales force sells during an evaluation period of a month or quarter. The sales typically measured by a manufacturer are quantity sold to distributors or retailers (sell-in), not the quantity sold to final customers (sell-through).

2. Information Processing Obstacles

Information processing obstacles refer to situations where demand information is distorted as it moves between different stages of the supply chain, leading to increased variability in orders within the supply chain.

i) **Forecasting Based on Orders and Not Customer Demand;** When stages within a supply chain make forecasts that are based on orders they receive, any variability in customer demand is magnified as orders move up the supply chain to manufacturers and suppliers. In supply chains that exhibit the builwhip effect, the fundamental means of communication between different stages are the orders that are placed. Each state views its primary role within the supply chain as one of filling orders placed by its downstream partner. Thus, each stage views its demand to be the stream of orders received and produces a forecast based on this information.

ii) **Lack of Information Sharing:** The lack of information sharing between stages of the supply chain magnifies the builwhip effect. **For example,** a retailer such as Wal-Mart may increase the size of a particular order because of a planned promotion. If the manufacturer is not aware of the planned promotion, they may interpret the larger order as a permanent increase in demand and place orders with suppliers accordingly. The manufacturer and suppliers thus have a lot of inventory right after Wal-Mart has finished their- promotion. Given the excess inventory, as future Wal-Mart orders return to normal, manufacturer orders will be smaller than before. The lack of information sharing between the retailer and manufacturer thus leads to a large fluctuation in manufacturer orders.

3. Operational Obstacles

Operational obstacles refer to actions taken in the course of placing and filling orders that lead to an increase in variability.

i) **Ordering in Large Lots:** When a firm place orders in lot sizes that are much larger than the lot sizes in which demand arises, variability of orders is magnified up the supply chain. Firms may order in large lots because there is a significant fixed cost associated with placing receiving, or transporting an order. Large lots may also occur if the supplier offers quantity discounts based or lot size.

ii) **Large Replenishment Lead Times:** The builwhip effect is magnified if replenishment lead times between stages are long. Consider a situation where a retailer has misinterpreted a random increase in demand as a growth trend. If the retailer faces a lead time of two weeks, they will incorporate the anticipated growth over two weeks when placing the order. In contrast, if the retailer faces a lead time of two months, they will incorporate into their order the anticipated growth over two months (which will be much larger). The same applies when a random decrease in demand is interpreted as a declining trend,

iii) **Rationing and Shortage Gaming:** Rationing schemes that allocate limited production in proportion to the orders placed by retailer lead to a magnification of the builwhip effect. A situation where a high-demand is in short supply often arises within the supply chain.

4. Pricing Obstacles: Pricing obstacles refer to situation in which the pricing policies for a product lead to an increase in variability of orders placed.

i) **Lots Size Based Quantity Discounts:** The resulting large lots magnify the bullwhip effect within the supply chain.

ii) **Price Fluctuations:** Trade promotions and other short-term discounts offered by a manufacturer result in forward buying where a wholesaler or retailer purchases large lots during the discounting period to cover demand during future periods.

5. **Behavioral Obstacles:** Behavioral obstacles refer to problems in learning within organizations that contribute to the bullwhip effect. These problems are often related to the way the supply chain is structured and the communication between different stages. Some of the behavioral obstacles are as follows:

i) Each stage of the supply chain views its actions locally and is unable to see the impact of its actions on other stages.

ii) Different stages of the supply chain react to the current local situation rather than trying to identify the root causes.

iii) Based on local analysis, different stages of the supply chain blame each other for the fluctuations, with successive stages in the supply chain becoming enemies rather than partners.

iv) No stage of the supply chain learns from its actions over time because the most significant consequences of the actions any one stage takes occur elsewhere. The result is vicious cycle where actions taken by a stage create the very problems that the stage blames on others.

v) A lack of trust between supply chain partners causes them to be opportunistic at the expense of overall supply chain performance. The lack of trust also results in significant duplication of effort. More important, information available at different stages is either not shared or is ignored because it is not trusted.

5.2.2 Managerial Levels

Q7. Discuss the Managerial Levels to achieve coordination in SCM.

Ans : **(Imp.)**

The following managerial actions in the supply chain increase total supply chain profits and moderate the bullwhip effect (as shown in figure below).

1. **Aligning of Goals and Incentives:** Managers can improve coordination within the supply chain by aligning goals and incentives such that every participant in supply chain activities works maximize total supply chain profits.

i) **Aligning Incentives Across Function:** One key to coordinated decisions within a firm is to ensure that the objective any function uses to evaluate a decision is aligned with the firm's overall objective. All facility, transportation, and inventory decisions should be evaluated based on their impact on profitability, not total costs, or even worse, just local costs. This helps avoid situation such as a transportation manager making decisions that lower transportation cost but increase overall supply chain costs.

ii) **Pricing for Coordination: A** manufacturer can use lot size based quantity discounts to **achieve** coordination for commodity products if the manufacturer has large fixed costs associated with each lot products where a firm has market power, a manager can use two-part tariffs and volume discounts to help achieve coordination.

iii) **Altering Sales Force Incentives from Sell-in to Sell-Through:** Any change that reduces the incentive for a salesperson to push product to the retailer will reduce the buliwhip effect. If sales force incentive: are based on sales over a rolling horizon, the incentive to push product is reduced. This helps reduce forward buying and the resulting fluctuation in orders. Another action

that managers can take is to link incentives for the sales stag to sell-through by the retailer rather than sell-in to the retailer. This action eliminates any motivation that sales staff may have to encourage forward buying. The elimination of forward buying helps reduce fluctuations in the order stream.

2. Improving Information Accuracy: Managers can achieve coordination by improving the accuracy of information available to different stages in the supply chain.

i) Sharing Point of Sales Data: Sharing point of sales (POS) data across the supply chain can help reduce the bullwhip effect. A primary cause for the bullwhip effect is the fact that each stage of the supply chain uses orders to forecast future demand. Given that orders received by different stages vary, forecasts at different stages also vary. In reality, the only demand that the supply chain needs to satisfy is from the final customer. If retailers share POS data with other supply chain stages, all supply chain stages can forecast future demand based on customer demand. Sharing of POS data helps reduce the bullwhip effect because all stages now respond to the same change in customer demand.

ii) Implementing Collaborative Forecasting and Planning: Once point of sales data is shared, different stages of the supply chain must forecast and plan jointly if complete coordination is to be achieved. Without collaborative planning, sharing of POS data does not guarantee coordination. A retailer may have observed large demand in the month of January because it ran a promotion. If no promotion is planned in the upcoming January, the retailer's forecast will differ from the manufacturer's forecast even if both have past POS data. The manufacture must be aware of the retailer's promotion plans to achieve coordination.

iii) Designing Single Stage Control of Replenishment: Designing a supply chain in which a single stage controls replenishment decisions for the entire supply chain can help diminish the bullwhip effect. The key cause for the bullwhip effect is the fact that each stage of the supply chain uses orders from the previous stage as its historical demand. As a result, each stage views its role as one of replenishing orders placed by the next stage. In reality, the key replenishment is at the retailer, because that is where the final customer purchases. When a single stage controls replenishment decisions for the entire chain, the problem of multiple forecasts is eliminated and co ordinations within the supply chain follows.

3. Improving Operational Performance: Managers can help dampen the bullwhip effect by improving operational performance and designing appropriate product rationing schemes in case of shortages.

i) Reducing Replaenishment Lead Replenishment Lead Time: By reducing the replenishment lead-time, managers can decrease the uncertainty of demand during the lead-time. A reduction in lead-time is especially beneficial for seasonal items because it allows for multiple orders to be placed in the season with a significant increase in the accuracy of the forecast. Thus, a reduction in replenishment lead-time helps dampen the bullwhip effect by reducing the underlying uncertainty of demand.

ii) Reducing Lot Sizes: Managers can dampen the bullwhip effect by implementing operational improvements that reduce lot sizes. A reduction of lot sizes decreases the amount of fluctuation that can accumulate between any pair of stages of a supply chain, thus decreasing the bullwhip effect. To reduce lost sizes, managers must take actions that help reduce the fixed costs associated with ordering, transporting, and receiving each lot.

iii) Rationing Based on Past Sales and Share Information to Limit Gaming: To diminish the bullwhip effect, managers can design rationing schemes that discourage retailers from artificially inflating their orders in the case of a shortage. One approach, referred to as turn-and-earn, I to allocate the available supply based on past retailer sales rather than

current retailer orders. Tying allocation to past sales removes any incentive a retailer may have to inflate orders, as a result dampening the bullwhip effect. In fact, during low-demand periods, the turn-and-earn approach pushes retailers to try and sell more to increase the allocation they receive during periods of shortages.

4. **Designing Pricing Strategies to Stabilize Orders:** Managers can diminish the bullwhip effect by devising pricing strategies that encourage retailers to order in smaller lots and reduce forward buying.

i) **Moving From Lot Size-Based to Volume-Based Quantity Discounts:** As a result of lot size-based quantity discounts, retailers increase their lot size to take full advantage of the discount. Offering volume-based quantity discounts eliminates the incentive to increase the size of a single lot because volume-based discounts consider the total purchases during a specified period (say a year) rather than purchases in a single lot. Volume based quantity discounts result in smaller lot sizes, thus reducing order variability in the supply chain. Volume-based discounts with a fixed end date at which discounts will be evaluated may lead to large lots close to the end date.

ii) **Stabilizing Pricing:** Managers can dampen the bullwhip effect by the eliminating promotions charging and EDLP (Every Day Low Price). The elimination of promotions removes forward buying by retailers and results in orders that match customer demand. P&G, Campbell Soup, and several other manufactures have implemented EDLP to dampen the bullwhip effect.

5. **Building Strategic Partnerships and Trust:** Managers find it easier to use the levers discussed earlier to diminish the bullwhip effect and achieve coordination if trust and strategic partnerships are built within the supply chain. Sharing of accurate information that is trusted by every stage results in a better matching of supply and demand throughout the supply chain and a lower cost. A better relationship also tends to lower the transaction cost between supply chain stages.

Managerial levers that help a supply chain achieve better coordination fall into two broad categories:

i) **Action Oriented Levers:** Action-oriented levers include information-sharing, changing of incentives, operational improvements, and stabilization of pricing.

ii) **Relationship Oriented Levers:** Relationship oriented levers involve the building of cooperation and trust within the supply chain.

5.2.3 Building Partnerships and Trust

Q8. Discuss the effective supply chain Partnership for building cooperation and trust.

Ans : **(Imp.)**

A trust-based relationship between two stages of a supply chain includes dependability of the two stages, and disability of each stage to make a leap of faith. Trust involves a belief that each stage is interested in the others welfare and would not take actions without considering their impact on the other stage. Cooperation and trust within the supply chain help improve performance for the following reasons.

1. A more natural aligning of incentives and objectives is achieved. When stages trust each other, they are more likely to take the other party's objective into consideration when making decisions.
2. Action-oriented managerial levers to achieve coordination become easier to implement, sharing of information is natural between parties that trust each other. Similarly, operational improvements are easier to design if both parties are aiming for the common good.
3. An increase in supply chain productivity results, either by elimination of duplicated effort or by allocating effort to the appropriate stage. For example, a manufacturer receives material from a supplier without inspecting it as long as the supplier shares process control charts. Another example may be the situation in which a distributor aids the postponement strategy of a manufacturer by performing customization just before the point of sale.

4. A greater sharing of detailed sales and production information results. This sharing allows the supply chain to coordinate production and distribution decisions. As a result, the supply chain is better able to match supply and demand, resulting in better coordination.

For building cooperation and trust with in a supply chain and developing a strategic partnership following points are essential to consider:

1. **Assessing the Benefits of the Relationship for each Party:** The value attached to a relationship by each party depends on the benefits that relationship provides to each party. A relationship can be built only when all the parties involved derive some benefits from the relationship.
2. **Analyzing the Operational Roles and Tasks of each Party:** Traditionally, in the supply chain, activities were arranged sequentially with a task being completed at one stage before being passed on to the other stage. This was termed as 'sequential interdependence'. But in the kind of supply chain one sees today, all the parties involved in the supply chain come together and exchange information and other necessary inputs. This method is termed as 'reciprocal interdependence. These teams come together to share information and decide on the best moves for every stage from forecasting to replenishment.
3. **Effective Contracts:** Contracts help to promote trust between partners in the supply chain. Contracts cover future contingencies and establish the ground rules. However, contracts may not be suitable in all the kinds of business environments. Unexpected situations may arise that are not mentioned in the contract. The two parties will then have to work together on the basis of the trust they have developed to meet the unexpected requirements.
4. **Techniques for Conflict Resolution:** In any relationship conflicts are bound to arise and it is necessary that certain mechanisms are in place to solve these conflicts. Communication between supply chain partners also helps in the promotion of trust; hence, meetings that encourage interaction should be held at appropriate intervals. The main aim of the meetings should be to promote the confidence of members in each other, and not just to voice differences.

5.2.4 Continuous Replenishment and Vendor Managed Inventories

Q9. Discuss about Continuous Replenishment and Vendor Managed Inventories.

Ans :

CRP focuses on improving the flow of products in the supply chain, both, forward to the customer and eventually the end consumer, and backward to the supplier.

The goals of CRP are to

- increase inventory turns.
- reduce inventory levels.
- decrease stock-outs.
- improve customer service levels.
- boost warehouse efficiency.
- enhance your trading partner's perception of value.

- Vendor Managed Inventory (VMI) is a term widely used when implementing CRP an arrangement where the supplier, not the customer, decides when and how much of the customer's stock is replenished. VMI focuses on assuring that products are replenished to stock in the most efficient way, without manual information such as orders having to be transferred between customer and supplier. Automatic electronic messages are used to keep track of the current stock situation and planned sales forecasts, so it can be determined when it is time to refill the stock and avoid stock-outs. VMI initiatives emerged in the late 1980s when department stores such as Wal-Mart moved to automated VMI.

- The objectives of VMI are to:
  - increase in-stock inventory.
  - increase sales.
  - improve customer service.
  - increase gross margins.
  - reduce overall inventory in the supply chain.
  - stabilise vendor's production.
- In the CRP-VMI process, these electronic messages are usually seen as:
  - inventory report.
  - sales forecast.
  - order response.
  - dispatch advice.
  - sales report.
  - invoice.
- Supplier benefits by CRP-VMI are:
  - simplifies forecasting due to visibility to the customer's point-of-sale data.
  - reduced customer ordering errors
  - stock level visibility helps identify priorities (the supplier can see the potential need for an item before the item is ordered)
- Customer benefits by CRP-VMI are:
  - improved fill rates from supplier and end consumer.
  - decreased stock outs and inventory levels.
  - decreased planning and ordering costs (the responsibility is shifted to the supplier).
  - improved service level overall (the right product at the right time).
  - supplier is provides superior service.
- Dual benefits by CRP-VMI are:
  - reduced data entry errors due to computer-to-computer communications.
  - improved overall processing speed.
  - better service offered to the end consumer by both parties.
  - true collaborative partnership between the supplier and the customer.
  - Long-term benefits include more efficient promotion handling.
  - Improved product introductions, more efficient product distribution and increased sales.

5.2.5 Collaborative Planning, Forecasting and Replenishment (CPFR)

Q10. Explain briefly about Collaborative Planning, Forecasting and Replenishment (CPFR).

Ans : **(Imp.)**

- CPFR is a business practice that combines the intelligence of multiple trading partners in the planning and fulfillment of customer demand.
- CPFR links sales and marketing best practices to supply chain planning and execution processes.
- Its objective is to increase availability to the customer while reducing inventory, transportation and logistics costs. It is an attempt to address the Bullwhip effect issue.
- The CPFR reference model provides a framework for planning, forecasting and replenishment process. A buyer and a seller work as collaboration partners to satisfy the customer demand which is at the centre of the model.

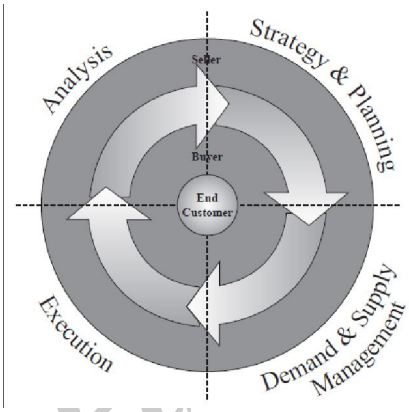


Fig.: CPFR model

- The importance of communication and collaboration can be seen from a well-documented example of Volvo and green cars. In the 80's, Volvo had a growing inventory of green cars. To reduce this growing inventory, a promotional campaign was initiated which turned out to be a huge success. The production department interpreted that the sales of green cars had a shoot up and assuming that demand has increased; they started producing more green cars. This again resulted in a growing inventory of green cars. Thus, if different entities collaborate and communicate in their functioning, the situation is always much better.

CPFR comprises of four main collaboration activities:

i) Strategy and planning

Establishing the ground rules for the collaborative relationship and developing event plans.

ii) Demand and supply management

Estimation of consumer demand and order and shipment requirements over the planning horizon

iii) Execution

Orders and shipments are placed and delivered, products are received and stocked, sales transactions are recorded and payments are made

iv) Analysis

Planning and execution are monitored, results are aggregated and key information is shared between the partners and plans and are adjusted for improving results.

5.3 Role of Information Technology in Supply Chain

Q11. State the characteristics of Information in supply chain?

Ans :

Introduction

Information is crucial to supply chain performance because it provides the foundation on which supply chain processes execute transactions and managers make decisions. Without information, a manager will not know what customers want, how much inventory is in stock, and when more products should be produced and shipped. In short, without information a manager can only make decisions blindly. Therefore, information makes the supply chain visible to a manager. With this visibility, a manager can make decisions to improve the supply chain's performance. In many ways, information is the most important of the four supply chain drivers because without it, none of the other drivers can be used to deliver a high level of performance.

Characteristics of Information in Supply Chain Decisions

Information must have the following characteristics to be useful when making supply chain decisions:

1. **Information must be Accurate:** Without information that gives the true picture of the state of the supply chain, it is very difficult to make good decisions. That is not to say all information must be 100% correct but rather that the data available paint a picture of reality that is at least directionally correct.
2. **Information must be Accessible in a Timely Manner:** Often accurate information exists, but by the time it is available, it is either out of date or if it is current, it is not in an accessible form. To make good decisions, a manager needs to have up-to-date information that is easily accessible.
3. **Information must be of The Right Kind:** Decision makers need information that they can use. Often companies will have large amounts of data that is not helpful with decision-making. Companies must think about what information should be recorded so that valuable resources are not wasted collecting meaningless data while important data goes unrecorded.

Q12. Critically examine the Role of Information Technology in Supply Chain Management.

Ans : **(Imp.)**

Role of Information Technology in SCM

Information Technology (IT) plays an important role in managing information and flow of goods. Organizations faced challenges for smooth integration of suppliers, wholesalers and retailers and also to manage data precisely for realtime in whole supply chain. Although, the emergence of different softwares such as EDI, GPS, RFID, ERP, WMS etc have significantly facilitated the smooth flow of supply chain management.

Technologies

Following are the technologies used in supply chain management,

1. Electronic Data Interchange (EDI)

Electronic Data Interchange (EDI) is the process where computers are used to exchange business related information. EDI plays a vital role in SCM. The significance of EDI in SCM can be understand from the following points,

(i) EDI reduces human involvement and increases paper less transactions.

(ii) It reduces the data storage expenses as storage and manupulation of data is done electronically.

(iii) EDI enables trading partners to complete the transactions quickly.

(iv) Through EDI inventory can be reduced with efficient planning information.

(v) Finally, EDI when joined together with artificial intelligence, results in efficient SCM.

Steps in EDI Implementation

Implementation of EDI system includes the following steps,

(i) Building an Organizational Structure

The first step in implementing the EDI system is building an organizational structure in which the process is either controlled and managed by a team or an individual person and maintain interaction with external parties.

(ii) Selecting the Location of EDI

Secondly, the various business activities are reviewed strategically and the areas where implementation of EDI would be beneficial are selected.

(iii) Identifying an EDI Solution

The next step is identifying an EDI network and software provider. This is done either by an expert within the organization professional or outside the organization.

(iv) EDI and other Systems

Integrating EDI with other back-end systems, reduces the expenses which enhances savings and improves overall business efficiency.

(v) Evaluating the Internal Business Processes

Proper information flow across EDI network is possible through mapping of all the business documents and systems.

(vi) Trail and Errors

Once the EDI system is ready to implement, a trail process must be carried out to rectify the errors if any.

(vii) Integrating Trading Patterns

Once the mistakes in implementing the EDI system are rectified, final step is integration of EDI system with trading partners.

2. Radio-Frequency Identification (RFID)

RFID stands for Radio Frequency Identification. RFID is an identification device used for describing several technologies which makes use radio waves to identify people, place or objects through radio signals.

RFID technology has been practised since many years, but it could not gain popularity due to its expensive installation and implementation. RFID technology is developing day-by-day and the researchers are trying to minimise the cost so that RFID can be used widely.

3. Bar Coding

A bar code is an arrangement of black and white bars of different width, whose sequence depicts either letters or numbers. This sequence is a code, which is being translated by the scanners into useful information such as the type of product, manufacturing place, price of the product, the starting point of shipment etc. Bar coding is a simple, useful, quicker and a correct technique which can store greater volume of information.

Q13. What are the current IT trends in SCM?

Ans :

The current IT trends in supply chain management.

1. Customer-Centric Investments

At present there is an increased focus on customer centric technologies and strategies. Better communication with customers and more productivity is the main moto of all the organizations. In supply chain industry, manufacturers focusses on customer demand for customer centricity that effect the individual product launch. It also creates an entire supply chain process which is customer focussed. The manufacturers are pushing

towards getting better in analyzing data sources, sensing demand, predicting market drivers and responding quickly and precisely in order to meet customer expectations.

2. Big Data Analysis

Big data is providing a greater data accuracy, clarity, decisive insight and signaling a rise in more contextual intelligence to supplier networks in the current era. These are shared throughout the supply chains. Modem analytics are mixed with more number of optimization tools involving demand forecasting, integrated business planning and super collaboration along with risk analytics. Further more, the big data analytics helps the supply chain to meet the accelerating demands for shipment and transactions as most of the organizations are forced to function as digital enterprises.

3. Cyber Security

According to the study conducted by deloitter and manufacturers alliance for productivity and innovation (MAPI) about 40% manufacturing companies were getting affected by cyber threats since last 12 months. These cyber threats with almost all cyber breaches have resulted in over $1 million damages. In order to protect the technologies from the threats, supply chain executives are focusing on data protection technologies and strategies.

4. Cloud Computing

Cloud computing applications provides a transformational effect on the business and the supply chain operating model through optimizing opportunities for flexible participation and enriched data analytics. The cloud- based supply network allows innovations in supply chain management. It empower information to be more readily available and bring huge value to operational processes with respect to end-to-end visibility.

5. Internet of Things (IOT)

According to Gartner's internet fo things in supply chain illustrates, how smart devices are changing the experience of customer and mean while how badly Internet of Things (IOT) innovations are tracking the supply chain. By 2020, it is estimated that internet of things will connect 25 billion devices creating both enthusiasm and doubt about the value to the supply chain. By implementing IOT supply chain, strategists can differentiate the future IOT with the current IOT. This innovation has already being initiated by Amazon with IOT order buttons that makes customers to place orders on a one click.

6. Digital Transformation

In the present market situations, digitalization is made mandatory for a success of the firm. A recent report stated that manufacturers who has not adopted digitalization have to confront struggles in order to succeed in future. The report states that, by 2018, only 30% of manufacturers will be able to maximize their profits through investing in digital transformation. By 2019,75% of large manufactu-rers will update their operating models with Internet of Things (IOT). In addition to this, by 2018, 60% of manufacturers will acquire new revenue from information-based products and services. Mean while, the embedded intelligence will more to the profitability levels.

Q14. Explain the process of Implementing IT enabled SCM system.

Ans : **(Imp.)**

There are many steps in the implementation of an IT-enabled supply chain management system, AS me 'implementation process is not just limited to one fion but involves all the firms spread across the supply chain, the process is usually complex and requires through analysis and planning. The implementation process is as follows :

1. Evaluating Organizational Requirements:

- The firm has to first evaluate its organizational needs and its internal environment. It should analyze whether

supply chain management fits into the organization's strategy and requirements.

- Implementing IT systems may require changes in the firm's relationships with suppliers and its internal business processes. So the firm should analyze the implications of implementing the system.

  For example, implementing an e-procurement application may reduce the number of suppliers needed and marginalize smaller suppliers who can not afford to implement IT systems.

- Thus implementing supply chain IT systems may have long term implications for the partners in the supply chain.
- The firm should undertake a cost-benefit analysis and evaluate the threats and opportunities involved in implementing the IT systems.
- Once the firm has examined all considerations and has decided to implement an IT system, it is usually the firm's IT department which oversees the implementation.

2. Evaluating the External Environment

- The firm has to evaluate the external players, i.e., upstream members like suppliers and downstream members like customers. The firm should choose a few supply chain partners to implement a pilot project.
- It should select partners who are willing to build a long term relationship with the firm, as this is crucial for successful implementation.
- The firm should also assess the partner's readiness to participate in the implementation. The partner's awareness and expertise in technology are other factors to be considered.
- The partner's chosen should have technical resources that are compatible with the firm's resources.
- Once the pilot project partners are selected, the next step is to decide on the technology to be used, i.e., the hardware and software solutions.

3. Identification of IT Infrastructure

The selection of IT infrastructure is the key to the smooth functioning of the IT system. The selection should be based on the requirements of the firm and also of the supply chain partners. The selection parameters should also include the reliability, quality and functionality of the hardware and software.

4. Actual Implementation of the IT System

- The IT system may be either developed in-house or outsourced, It is also possible to buy an off-the shelf package; there are many available in the market.
- As the scope of the system extends beyond the firm to outside partners, the implementation is often complex and time consuming.
- The success of the implementation depends not just on the ability and expertise of the firm but also on the partners' level of readiness and co-operation.
- If some of the partners have already adopted certain systems in their firms, the compatibility of the systems could become a key issue in implementation. This problem is greater if the partners or the firm use proprietary systems.
- So it is better for a firm to adopt a system based on open standards, which enables easier integration with different systems.
- Another important issue in implementation is to convince the partners to adopt the system.
- The firm may use different strategies for this. If the firm is the major member of the supply chain, then partner firms will usually defer to its wishes. Big firms like Wal-Mart, Ford and GM are examples

of this situation. Otherwise, the firm can provide incentives and concessions to encourage its partners to adopt the system. It may provide discounts or assistance to its partners through training and implementation support.

5. Scaling up the System

- If the pilot project is successful, the firm can extend or expand the system to other supply chain partners or to other functions.
- If the firm has implemen-ted the application with one or two partners, then the application can be extended to multiple partners. The firm can also try to add other services or systems depending upon the success of the implementation of a particular system.

  For example, if the firm has implemented an e-procurement application, the firm can move on by adding on other functionalities to the application like electronic payments so that the entire purchasing function is automated.

6. Resolve Implementation Issues

- There are several implementation issues that need to be resolved. The first issue is whether the implementation should be module-by-module or system-wide implementation.
- In module-by-module implementation, the company implements certain modules before others. This type of implementation keeps implementation costs down. The process of change is also more gradual so implemen-tation is smoother.
- The other approach to implementation is system wide implemen-tation. System wide implemen-tation takes much more time. Companies adopt module-by-module implementation as it is faster and enables them to catch up with their competitors.
- Moduie-by-module implemen-tation is usually recommended. But the firm should ensure that the focus is on system-wide integration and the implementation of each module should be undertaken with this in mind.

5.7 Supply Chain 4.0

Q15. What is Supply Chain 4.0? Discuss the benefits of adopting supply chain 4.0.

Ans : **(Imp.)**

Supply chain 4.0 is the improved version of the supply chain that incorporates a variety of Industry 4.0 technologies like IoT, AI, cloud, and big data. It combines advanced AI algorithms, business intelligence tools, data sciences and other next-gen technologies to significantly improve supply chain management. Besides, the internet of things renders connectivity across different SCM and logistics activities, enabling enterprises to track shipments and automate workflows. At the same time, it enables enterprises to overcome many challenges associated with traditional SCM methodologies and builds resilience. In the following section, we shall explore the main benefits of adopting Industry 4.0 technologies to improve supply chain management.

Benefits

Implementing industry 4.0 technologies in supply chain management can be beneficial for enterprises in many ways. Read further to explore the main benefits of supply chain 4.0 for companies belonging to manufacturing, retail, and eCommerce industries.

i) Improved Supply Chain Management

Industry 4.0 technologies can significantly improve supply chain productivity by virtue of process management, demand and supply planning, S&OP, and other critical SCM activities. Besides, you can centrally manage all these activities through a common holistic digital ecosystem. It also streamlines warehouse operations and brings agility in inventory management processes by using data analytics techniques and IoT sensors.

ii) End-to-end Transparency

Supply chain 4.0 renders a great deal of transparency within the digital SCM ecosystem. At the same time, it facilitates seamless data exchange between suppliers, vendors, and warehouse managers to avoid all possible discrepancies. The use of IoT sensors paves the way for real-time asset tracking that further streamlines warehouse management processes. Also, there are cloud-based dashboards that enable enterprises to centrally manage a host of warehouse and supply chain activities.

iii) Intelligent Decision Making

The use of AI-driven ERP systems and business intelligence tools could be increasingly beneficial for enterprises as they provide accurate sales forecasts and facilitates intelligent decision-making. Besides, enterprises can use machine learning algorithms and predictive analytics techniques to analyze market trends and provide statistical insights for demand forecasting.

iv) Smart Logistics

In view of the fourth industrial revolution, connected vehicles have become a new normal for logistics companies to successfully run their operations. Under supply chain 4.0, we now have smart logistics solutions that are powered by next-gen technologies like IoT, data analytics, and machine learning. Nevertheless, the COVID-19 pandemic paved the way for fully autonomous vehicles to deliver shipments with minimal physical contact. These vehicles are powered by advanced deep learning algorithms and are effective at efficiently handling large volumes of shipments with sheer efficacy.

v) Conclusion

Supply chain 4.0 is by far the most advanced form of the supply chain that enables enterprises to overcome many challenges prevalent in the industry. A large number of manufacturing companies are already leveraging the unique features brought in by supply chain 4.0. According to Gartner, about 80 percent of organizations are likely to invest in connected technologies in the coming years. That said, it seems like an opportune time to invest in this unique technological ecosystem and build resilience for the future. Nevertheless, it is equally important to collaborate with a trusted technology partner to extract the true benefits of these revolutionary technologies.

Short Question and Answers

1. Define Coordination.

Ans :

Supply chain management (SCM) is concerned with the management of material, information, and financial flows in a network consisting of suppliers, manufacturers, distributors, and customers.

Coordination and integration of these flows within and across companies are critical in effective supply chain management.

2 Inter-Functional Coordination

Ans :

Inter-functional coordination can be defined as working together across functions or departments. Within a particular firm inter-functional coordination can be defined as the coordinated efforts across functions to accomplish common goals, such as creating customer value and responsiveness to market changes, under close relationships among the functions.

3. Inter-Corporate Coordination

Ans :

- Inter-corporate coordination is the second level of coordination in the supply chain. In this, firm develops cooperation or alliances from outside parties or firms to improve its efficiency. Inter-corporate coordination is simply a coordination betweens various corporate or firms.
- According to Gulati, "Inter-corporate coordination/alliances encompass a variety of agreements whereby two or more firms agree to pool their resources to pursue specific market opportunities".

4. Explain the various causes lack of supply chain coordination.

Ans :

- When all stages in the supply chain take actions together, it usually results in greater total supply chain profits.
- SC coordination requires that each stage take into account the effects of its actions on the other stages.

5. Bull-whip Effect

Ans :

The phenomenon of increase in the demand or order variability across the supply chain while moving upwards i.e., from customers to manufacturers is termed as "bull-whip effect".

In case of products with stable demand the retail sales will remain constant but there has been an increase in fluctuations in order quantities placed by distributors and wholesalers and manufacturers which resulted in increase in inventory and back order levels in a supply chain.

6. Continuous Replenishment

Ans :

CRP focuses on improving the flow of products in the supply chain, both, forward to the customer and eventually the end consumer, and backward to the supplier.

The goals of CRP are to

- Increase inventory turns.
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(iv) Through EDI inventory can be reduced with efficient planning information.

(v) Finally, EDI when joined together with artificial intelligence, results in efficient SCM.

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Ans :

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Choose the Correct Answers

1. Special purpose material handling equipment are used in _____ [a]
   (a) Line layout (b) Process layout
   (c) In-land layout (d) Warehousing
2. _____ can move carton loads or pallet loads horizontally or vertically. [d]
   (a) Conveyor belts (b) Cranes
   (c) Elevators (d) Forklift trucks
3. Customer service create time and _____ utility for the customer. [c]
   (a) distribution (b) supply
   (c) place (d) sales
4. _____ represent the frequency of satisfying customer order in given span of time. [b]
   (a) order cycle time (b) fill rate
   (c) perfect order (d) system flexibility
5. Conveyor belt facilitate continuous movement of material over a _____ Route. [a]
   (a) Fixed (b) Flexible
   (c) Rotational (d) Safe
6. A _____ is a set of customer service goals which are to be achieved within a specific combination or mix of products and customer segment. [a]
   (a) Mission (b) Objective
   (c) Vision (d) Target
7. The objective of outbound supply chain is to make the product available to the…… [a]
   (a) Customer (b) Retailor
   (c) Whole seller (d) Supplier
8. A supply chain is essentially a sequence of linked: [c]
   (a) customer and prospects (b) supplier and manufacturer
   (c) suppliers and customers (d) warehousing and wholesaling units
9. Value stream mapping is an application of process mapping, developed to apply principles to process improvement. [b]
   (a) Management (b) Lean
   (c) Supply chain (d) Cycle time
10. Cross docking is the major SC technique used by [b]
   (a) Flipkart (b) Wall mart
   (c) Dell (d) Zara

Fill in the Blanks

1. _____ coordination is the second level of coordination in the supply chain.
2. Time and _____ competition focus on eliminating waste in the form of time, effort, defective units, and inventory.
3. _____ partnerships can reduce the impact of bull-whip effect on firm's operations.
4. _____ has a significant impact on demand estimation variability.
5. EDLP stands for _____.
6. _____ obstacles refer to situations where incentives offered to different stages or participants in a supply chain lead to actions that increase variability and reduce total supply chain profits.
7. _____ obstacles refer to situations where demand information is distorted as it moves between different stages of the supply chain.
8. _____ obstacles refer to problems in learning within organizations that contribute to the bullwhip effect.
9. VMI stands for _____.
10. CPFR stands for _____.

ANSWERS

1. Inter-corporate
2. Quality-based
3. Strategic
4. Lead time
5. Every Day Low Price
6. Incentive
7. Information processing
8. Behavioral
9. Vendor Managed Inventory
10. Collaborative Planning Forecasting and Replenishment

Very Short Questions and Answers

1. Inter-Functional Coordination

Ans :

Inter-functional coordination can be defined as working together across functions or departments. Within a particular firm inter-functional coordination can be defined as the coordinated efforts across functions.

2. Mass Customization

Ans :

Mass customization is a new way of viewing competition for both manufacturing and service industries.

3. Pricing Obstacles

Ans :

Pricing obstacles refer to situation in which the pricing policies for a product lead to an increase in variability of orders placed.

4. Objectives of VM.

Ans :

- Increase in-stock inventory.
- Increase sales.
- Improve customer service.
- Increase gross margins.

5. Information Technology in SCM

Ans :

Information Technology (IT) plays an important role in managing information and flow of goods.

Internal Assessment (Mid Examinations)

In CIE, for theory subjects, during a semester, there shall be two mid-term examinations. Each MidTerm examination consists of two parts i) Part – A for 10 marks, ii) Part – B for 20 marks with a total duration of 2 hours as follows:

1. Mid-Term Examination for 30 marks:

   (a) Part - A: Objective/quiz paper/Short Note questions for 10 marks.

   (b) Part - B: Descriptive paper for 20 marks.

   The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks. The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The average of the two Mid Term Examinations shall be taken as the final marks for Mid Term Examination (for 30 marks). The remaining 10 marks of Continuous Internal Evaluation are distributed as:

2. Assignment for 5 marks. (Average of 2 Assignments each for 5 marks)

3. PPT/Poster Presentation/ Case Study/Video presentation/Survey/Field Study/Group discussion /Role Play on a topic in the concerned subject for 5 marks before II Mid-Term Examination.

While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus.

Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination. The average of the two assignments shall be taken as the final marks for assignment (for 5 marks).

PPT/Poster Presentation/ Case Study/Video presentation/Survey/Field Study/Group discussion /Role Play on a topic in the concerned subject for 5 marks before II Mid-Term Examination.

UNIT - I

Part - A

Multiple Choice Questions

1. The purpose of supply chain management is [c]

   (a) provide customer satisfaction

   (b) improve quality of a product

   (c) integrating supply and demand management

   (d) increase production

2. Inbound and outbound logistics is [b]
   (a) a support activity (b) a primary activity
   (c) not an activity (d) the only activity
3. HRM is in the generic value chain of logistics. [c]
   (a) a support activity (b) a primary activity
   (c) not an activity (d) the only activity

Fill in the Blanks

4. _____ involves a wide range of activities. Companies must first decide on their operations strategy. **(Planning)**
5. _____ arrival means the arrival of a customer to the market to make a purchase of his or her choice. **(Customer)**
6. _____ logistics has, as main tasks, the delivery of the finished products to the customer. **(Distribution)**

Short Notes

7. Supply Chain. **(Unit-I, SQA -1)**
8. Cycle View of Supply Chain Management. **(Unit-I, SQA -4)**
9. Procurement logistics. **(Unit-I, SQA -6)**
10. What is Supply Chain Strategy? **(Unit-I, SQA - 8)**

Part - B

1. Explain the significance of Supply Chain Management. **(Unit-I, Q.No. 4)**
2. Explain the various stages of Supply Chain. **(Unit-I, Q.No. 5)**
3. Explain the conceptual framework of supply chain management. **(Unit-I, Q.No. 6)**
4. Explain the concept of Value Chain Process in supply chain management. **(Unit-I, Q.No. 8)**
5. Discuss the Obstacles of Streamlined SCM. **(Unit-I, Q.No. 19)**
6. What is Supply Chain Sustainability? How to improve Supply Chain Sustainability? **(Unit-I, Q.No. 22)**

UNIT - II

Part - A

Multiple Choice Questions

1. The _____ system should be designed after analysing the needs for the organization. [c]
   (a) Warehousing (b) Logistics
   (c) Material handling (d) Distribution

2. _____ is a function of re-arranging and re- packing as per individual orders. [c]

(a) Break- Bulk (b) Warehousing

(c) Cross Docking (d) Sorting

3. _____ is the fastest mode of transport. [d]

(a) Road transport (b) Railway transport

(c) Water transport (d) Air Transport

Fill in the Blanks

4. WMS stands for _____. **(Warehouse management systems)**

5. _____ is the area of physical distribution that has experienced the greatest change and improvement in efficiency. **(Material handling)**

6. _____ is a method of cross docking where goods move in a constant flow between the receiving and shipping areas. **(Continuous cross docking)**

Short Notes

7. Procurement /Purchasing. **(Unit-II, SQA - 2)**

8. Warehousing. **(Unit-II, SQA - 3)**

9. Material Handling. **(Unit-II, SQA - 4)**

10. Order-Sizing. **(Unit-II, SQA - 5)**

Part - B

1. Explain the objectives of logistics management. **(Unit-II, Q.No. 2)**

2. Explain the Functions of Logistics Management. **(Unit-II, Q.No. 4)**

3. Compare and contrast Supply Chain management and Logistics management. **(Unit-II, Q.No. 6)**

4. How Competitive Advantage gained through logistics management. **(Unit-II, Q.No. 8)**

5. What is Outsourcing? Explain the benefits of Outsourcing. **(Unit-II, Q.No. 26)**

6. Define Third-party Logistics (3PL). What are the functions of 3PL's? **(Unit-II, Q.No. 28)**

UNIT - III

Part - A

Multiple Choice Questions

1. Factors affecting network design decisions. [d]

(a) Strategic factor (b) Micro economic factor

(c) Competitive factor (d) All the above

2. The logistics strategic analysis [b]
   (a) Reflects the capability of the management to think beyond the current way.
   (b) Reflects the extent of use of logistical component for competitive advantage.
   (c) Ensures effective implementation of logistics strategy.
   (d) Deals with managing change.
3. The term _____ refers to any idle resources that can be put to some future use. [a]
   (a) Inventory (b) Warehousing
   (c) Logistics (d) Procurement

Fill in the Blanks

4. _____ requires companies to work together by combining their operations and removing the obstacles. **(E-Collaboration)**
5. _____ is made possible by effective leadership, clear communications and efficient systems and equipment to enable productive operations and a fulfilling work environment. **(Accountability)**
6. EFT stands for _____. **(Electronic funds transfer)**

Short Notes

7. Distribution Network. **(Unit-III, SQA - 1)**
8. Define e-Business. **(Unit-III, SQA - 2)**
9. Disadvantages of e-business. **(Unit-III, SQA - 5)**
10. Objectives of supply chain network design. **(Unit-III, SQA - 7)**

Part - B

1. Explain the role of distribution network in supply chain management. **(Unit-III, Q.No. 1)**
2. Explain briefly various distribution options for a distribution network. **(Unit-III, Q.No. 3)**
3. Explain the impact of e-business on supply chain management. **(Unit-III, Q.No. 6)**
4. Explain the advantages and disadvantages of e-business. **(Unit-III, Q.No. 7)**
5. Explain about Distribution Networks in Practice. **(Unit-III, Q.No. 11)**
6. Discuss the model of supply chain. **(Unit-III, Q.No. 14)**

UNIT - IV

Part - A

Multiple Choice Questions

1. The purpose of _____ is to arrive at a realistic projection of demand patters across different market and for different product lines. [a]
   (a) Demand forecasting (b) Speculation
   (c) Logistics (d) Supply chain management

2. Buying according to the requirements is called _____. [d]

(a) Seasonal Buying (b) Scheduled Buying

(c) Tender Buying (d) Hand to mouth buying

3. _____ comprises of raw materials, components, and fuels, etc. which are required to facilitate manufacturing operations. [a]

(a) Raw material inventory (b) Work in process inventory

(c) Finished goods inventory (d) Average inventory

Fill in the Blanks

4. The _____ effect on the supply chain occurs when changes in consumer demand causes the companies in a supply chain to order more goods to meet the new demand. **(Bullwhip)**

5. SCOR stands for _____. **(The Supply Chain Operations Reference Model)**

6. DDSN stands for _____. **(Demand-driven Supply Network)**

Short Notes

7. What is performance measurement? **(Unit-IV, SQA - 2)**

8. Resource Utilization. **(Unit-IV, SQA - 4)**

9. Weaknesses of SCOR Model. **(Unit-IV, SQA - 6)**

10. Performance-Cycle Length. **(Unit-IV, SQA - 8)**

Part - B

1. What is Bullwhip Effect? How Do minimize the bullwhip effect? **(Unit-IV, Q.No. 1)**

2. Explain various tools of performance measurement in supply chain management **(Unit-IV, Q.No. 4)**

3. Discuss about SCOR Model. **(Unit-IV, Q.No. 5)**

4. Discuss about Demand Chain Management. **(Unit-IV, Q.No. 8)**

5. What are the major differences between Global Supply Chain and Domestic Supply Chain? **(Unit-IV, Q.No. 12)**

6. What are the factors influence Designing Global Supply Chain Network? **(Unit-IV, Q.No. 13)**

UNIT - V

Part - A

Multiple Choice Questions

1. Special purpose material handling equipment are used in _____ [a]

(a) Line layout (b) Process layout

(c) In-land layout (d) Warehousing

2. A _____ is a set of customer service goals which are to be achieved within a specific combination or mix of products and customer segment. [a]

   (a) Mission (b) Objective

   (c) Vision (d) Target

3. Value stream mapping is an application of process mapping, developed to apply principles to process improvement. [b]

   (a) Management (b) Lean

   (c) Supply chain (d) Cycle time

Fill in the Blanks

4. Time and _____ competition focus on eliminating waste in the form of time, effort, defective units, and inventory. **(Quality-based)**

5. _____ partnerships can reduce the impact of bull-whip effect on firm's operations. **(Strategic)**

6. EDLP stands for _____. **(Every Day Low Price)**

Short Notes

7. Define Coordination. **(Unit-V, SQA - 1)**

8. Inter-Corporate Coordination. **(Unit-V, SQA - 3)**

9. Continuous Replenishment. **(Unit-V, SQA - 6)**

10. Electronic Data Interchange(EDI). **(Unit-V, SQA - 8)**

Part - B

1. Define Coordination. Explain various levels of coordination in supply chain management. **(Unit-V, Q.No. 1)**

2. Explain the importance of coordination in supply chain management **(Unit-V, Q.No. 2)**

3. Explain the concept of bull-whip effect in SCM. **(Unit-V, Q.No. 4)**

4. What are the various methods through which impact of bull-whip effect can be reduced? **(Unit-V, Q.No. 5)**

5. Discuss the Managerial Levels to achieve coordination in SCM. **(Unit-V, Q.No. 7)**

6. What is Supply Chain 4.0? Discuss the benefits of adopting supply chain 4.0. **(Unit-V, Q.No. 15)**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.B.A II Semester Examinations **R22**

MODEL PAPER - I

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Time : 3 Hours] **[Max. Marks : 60**

Note : This question paper contains two parts **A** and **B**.

Part A is compulsory which carries 10 marks. Answer all questions in **Part A.**

Part B consists of 5 Units. Answer any **One** full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART - A (10 × 1 = 10 Marks)

ANSWERS

1. (a) Supply Chain. **(Unit - I, SQA-1)**

   (b) Procurement logistics. **(Unit - I, SQA-6)**

   (c) Procurement /Purchasing **(Unit - II, SQA-2)**

   (d) Material Handling **(Unit - II, SQA-4)**

   (e) Distribution Network. **(Unit - III, SQA-1)**

   (f) Objectives of supply chain network design. **(Unit - III, SQA-7)**

   (g) Bullwhip Effect. **(Unit - IV, SQA-1)**

   (h) Define Global Supply Chain. **(Unit - IV, SQA-7)**

   (i) Define Coordination. **(Unit - V, SQA-1)**

   (j) Electronic Data Interchange (EDI) **(Unit - V, SQA-8)**

PART - B (5 × 10 = 50 Marks)

2. Explain the concept of Value Chain Process in supply chain management. **(Unit - I, Q.No. 8)**

OR

3. Explain the process of achieving Strategic Fit. **(Unit - I, Q.No. 15)**

4. Define Logistics and Logistics Manage-ment. Explain the evolution of Logistics Management. **(Unit - II, Q.No. 1)**

OR

5. (a) What do you mean by reverse logistics? State its need and benefits. **(Unit - II, Q.No. 21)**

   (b) Explain the Functions of Logistics Management. **(Unit - II, Q.No. 4)**

6. Discuss the model of supply chain. **(Unit - III, Q.No. 14)**

OR

7. Explain the impact of e-business on supply chain management. **(Unit - III, Q.No. 6)**

8. Discuss about SCOR Model. **(Unit - IV, Q.No. 5)**

OR

9. What are the factors influence Designing Global Supply Chain Network? **(Unit - IV, Q.No. 13)**

10. Explain the concept of bull-whip effect in SCM. **(Unit - V, Q.No. 4)**

OR

11. Explain briefly about Collaborative Planning, Forecasting and Replenishment (CPFR). **(Unit - V, Q.No. 10)**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.B.A II Semester Examinations **R22**

MODEL PAPER - II

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Time : 3 Hours] **[Max. Marks : 60**

Note : This question paper contains two parts **A** and **B**.

Part A is compulsory which carries 10 marks. Answer all questions in **Part A.**

Part B consists of 5 Units. Answer any **One** full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART - A (10 × 1 = 10 Marks)

ANSWERS

1. (a) Define Supply Chain Management. **(Unit - I, SQA-2)**

   (b) Push/Pull View of SCM **(Unit - I, SQA-5)**

   (c) Objectives of logistics management. **(Unit - II, SQA-1)**

   (d) Order-Sizing **(Unit - II, SQA-5)**

   (e) Define e-Business. **(Unit - III, SQA-2)**

   (f) Challenges of Network Design. **(Unit - III, SQA-8)**

   (g) What is performance measurement? **(Unit - IV, SQA-2)**

   (h) Resource Utilization. **(Unit - IV, SQA-4)**

   (i) Inter-Functional Coordination **(Unit - V, SQA-2)**

   (j) Customer-Centric Investments **(Unit - V, SQA-9)**

PART - B (5 × 10 = 50 Marks)

2. Describe concept of Cycle View of Supply Chain Process. **(Unit - I, Q.No. 9)**

OR

3. Explain the best practices in supply chain management. **(Unit - I, Q.No. 18)**

4. How Competitive Advantage gained through logistics management. **(Unit - II, Q.No. 8)**

OR

5. (a) Define Third-party Logistics (3PL). What are the functions of 3PL's? **(Unit - II, Q.No. 28)**

   (b) State the advantages and disadvantages of 3PLS? **(Unit - II, Q.No. 30)**

6. Explain the role of distribution network in supply chain management. **(Unit - III, Q.No. 1)**

OR

7. Describe the various Factors Affecting the Network Design Decisions. **(Unit - III, Q.No. 13)**

8. What is Bullwhip Effect? How Do minimize the bullwhip effect? **(Unit - IV, Q.No. 1)**

OR

9. What are the major differences between Global Supply Chain and Domestic Supply Chain? **(Unit - IV, Q.No. 12)**

10. Discuss the effective supply chain Partnership for building cooperation and trust. **(Unit - V, Q.No. 8)**

OR

11. Discuss various obstacles to coordination in the supply chain management. **(Unit - V, Q.No. 6)**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.B.A II Semester Examinations **R22**

MODEL PAPER - III

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Time : 3 Hours] **[Max. Marks : 60**

Note : This question paper contains two parts **A** and **B**.

Part A is compulsory which carries 10 marks. Answer all questions in **Part A.**

Part B consists of 5 Units. Answer any **One** full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART - A (10 × 1 = 10 Marks)

ANSWERS

1. (a) Value Chain. **(Unit - I, SQA-3)**

   (b) Green Logistics **(Unit - I, SQA-7)**

   (c) Warehousing **(Unit - II, SQA-3)**

   (d) What is Cross Docking? **(Unit - II, SQA-9)**

   (e) Disadvantages of e-business. **(Unit - III, SQA-5)**

   (f) Supply Chain Network Design. **(Unit - III, SQA-6)**

   (g) Cycle Time. **(Unit - IV, SQA-3)**

   (h) Weaknesses of SCOR Model. **(Unit - IV, SQA-6)**

   (i) Inter-Corporate Coordination **(Unit - V, SQA-3)**

   (j) Vendor Managed Inventory **(Unit - V, SQA-7)**

PART - B (5 × 10 = 50 Marks)

2. Explain briefly about Supply Chain Drivers and Obstacles? **(Unit - I, Q.No. 13)**

OR

3. What is Supply Chain Sustainability? How to improve Supply Chain Sustainability? **(Unit - I, Q.No. 22)**

4. Explain various Mode of Transportation Network and Decision. **(Unit - II, Q.No. 14)**

OR

5. (a) Compare and contrast Supply Chain management and Logistics management. **(Unit - II, Q.No. 6)**

   (b) What is meant by Fourth-party Logistics (4PL)? State its components. **(Unit - II, Q.No. 29)**

6. Explain briefly various distribution options for a distribution network. **(Unit - III, Q.No. 3)**

OR

7. Why is it said that e-procurement is a replica of e-commerce? **(Unit - III, Q.No. 9)**

8. Explain the Challenges in Establishing Global Supply Chain. **(Unit - IV, Q.No. 11)**

OR

9. Explain various tools of performance measurement in supply chain management. **(Unit - IV, Q.No. 4)**

10. Define Coordination. Explain various levels of coordination in supply chain management. **(Unit - V, Q.No. 1)**

OR

11. What is Supply Chain 4.0? Discuss the benefits of adopting supply chain 4.0. **(Unit - V, Q.No. 15)**