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ਪੰਜਾਬ ਸਟੇਟ ਓਪਨ ਯੂਨੀਵਰਸਿਟੀ
ਪਟਿਆਲਾ

JAGAT GURU NANAK DEV
PUNJAB STATE OPEN UNIVERSITY, PATIALA

(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)

The Motto of the University

(SEWA)

SKILL ENHANCEMENT EMPLOYABILITY WISDOM ACCESSIBILITY



Certificate/Diploma Course in
Retail and Sales Management
DRS6–Logistics and Supply Chain Management

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PREFACE

Jagat Guru Nanak Dev Punjab State Open University, Patiala was established in December 2019 by Act 19 of the Legislature of State of Punjab. It is the first and only Open University of the State, entrusted with the responsibility of making higher education accessible to all, especially to those sections of society who do not have the means, time or opportunity to pursueregular education.

In keeping with the nature of an Open University, this University provides a flexible educationsystem to suit every need. The time given to complete a programme is double the duration ofa regular mode programme. Well-designed study material has been prepared in consultation with experts in their respective fields.

The University offers programmes which have been designed to provide relevant, skill-based and employability-enhancing education. The study material provided in this booklet is self- instructional, with self-assessment exercises, and recommendations for further readings. The syllabus has been divided in sections, and provided as units for simplification.

The Learner Support Centres/Study Centres are located in the Government and Government aided colleges of Punjab, to enable students to make use of reading facilities, and for curriculumbased counselling and practicals. We, at the University, welcome you to be a part of this institution of knowledge.

Dr. Amitoj Singh
Associate Dean Academic Affairs

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Certificate/Diploma Course in
Retail and Sales Management
DRS6–Logistics and Supply Chain Management

COURSE COORDINATOR AND EDITOR: DR. SULAKSHNA

SECTION A

UNIT NO.	UNIT NAME
UNIT 1	Logistics
UNIT 2	Supply Chain
UNIT 3	Dynamics of supply chain
UNIT 4	Supply Chain Performance

SECTION B

UNIT NO.	UNIT NAME
UNIT 5	Transportation:
UNIT 6	Recent trends in Logistics and Supply Chain Management

Certificate/Diploma Course in
Retail and Sales Management
DRS6–Logistics and Supply Chain Management

Max. Marks: 100
External: 70
Internal: 30
Pass: 40%
Credits: 6

Learning Objectives:

The course aims to achieve following objectives1. To impart conceptual knowledge of Logistics and Supply chain management

2. To acquaint students with the Inventory Management
3. To help students gain knowledge of relationship between E-Commerce and Logistics And supply chain management

SECTION A

Unit -I –Logistics: Evolution, Objectives, Components and Functions of Logistics Management, Distribution

Related Issues and Challenges; gaining competitive advantage through Logistics Management, Transportation- Functions, Costs, and Mode; Network and Decision, Containerization, Cross docking.

Unit -II -Supply Chain : Concepts: Objectives of a Supply Chain, 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.

Unit -III- Dynamics of supply chain: Supply Chain Integration, Push-based, Pull-based and Push, Pull based supply chain, Demand Forecasting in a Supply Chain, Managing inventory in SC environment: Transportation in SC environment. Strategic Alliances, Third party and fourth party logistics,

Retailer- Supplier partnerships (RSP), Supplier evaluation and selection, Use of best practices and Information Technology (IT) in Supply Chain Management.

Unit -IV - Supply Chain Performance: Introduction, 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 influences designing Global Supply Chain Network.

SECTION B

Unit-V: Transportation: Transportation Infrastructure; Transport Functionality, Principles & Participants, Regulations, Transport Structure, Transport Service, Transport Operations; Transport Economics and Pricing, Transportation Administration, Documentation.

Unit-VI –Recent trends in Logistics and Supply Chain Management Logistics Information System: Concept of Logistics Information System (LIS), Importance of LIS, Principles of designing LIS, Logistics Information Architecture, Application of Information Technology in Logistics and Supply Chain Management, Requirements of Logistics in Ecommerce, E-Logistics Structure and Operation.

Suggested Readings:

1. Ayers, J. B. (2006). Handbook of supply chain management (2nd ed.). Florida: Auerbach Publication.
2. Ballou, R. H., & Srivastava, S. K. (2008). Business logistics/ supply chain management (5th

ed.). New Delhi: Pearson Education.
3. Chopra, S., &Meindl, P. (2007). Supply chain management: Strategy, planning and operation (3rd ed.). New Delhi: Pearson Education.
4. Coyle, J. J., Bardi, L. J., & Langley, C. J. (2008). The management of business logistics (7th ed.). USA: South-Western.
5. Dornier, P. P., Ernst, R., Fender, M., &Kouvelis, P. (1998). Global Operations Management and Logistics: Text and Cases. New York: John Wiley & Sons.

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UNIT-1 LOGISTICS

STRUCTURE

1.0 Objectives
1.1 Introduction to Logistics Management
1.2 Evolution of Logistics Management
1.3 Objectives of Logistics Management
1.4 Components and Functions of Logistics Management
1.5 Distribution Related Issues and Challenges
1.6 Gaining Competitive Advantage through Logistics Management
1.7 Functions of Transportation
1.8 Cost and Mode
1.9 Network and Decisions
1.10 Containerization
1.11 Cross Docking
1.12 Unit End Questions
1.13 References

1.0 Objectives

After completing this Students will be able to

- Define logistics management
- Understand evolution of logistics management
- Define transportation
- Explain Containerization and cross docking
-

1.1 Introduction to Logistics Management

Logistics management consists of the process of planning, implementing and controlling the efficient flow of raw-materials, work-in-progress and finished goods and related information-from point of origin to point of consumption; with a view to providing satisfaction to the customer.

According to Phillip Kotler, "Market logistics involve planning, implementing and controlling physical flow of material and final (finished) goods from the point of origin to the point of use to meet customer requirements, at a profit."

Classification of Logistical Activities

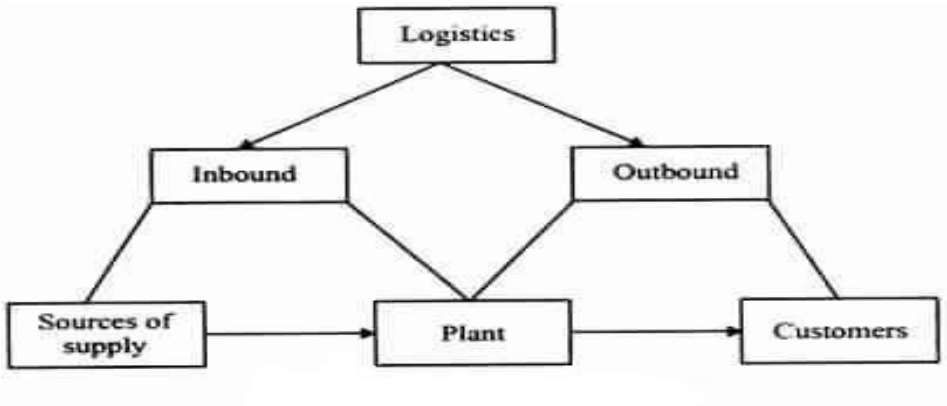


Fig: 1.1 Logistical Activities

(i) Inbound Logistics

Inbound logistics is concerned with the smooth and cost effective inflow of materials and other inputs (that are needed in the manufacturing process) from suppliers to the plant. For proper management of inbound logistics, the management has to maintain a continuous interface with suppliers (vendors).

(ii) Outbound Logistics

Outbound logistics (also called physical distribution management or supply chain management); is concerned with the flow of finished goods and other related information from the firm to the customer. For proper management of outbound logistics, the management has to maintain a continuous interface with transport operators and channels of distribution.

1.2 Evolution Of Logistics Management

The evolution of logistics in the 1990s can be traced back to "physical distribution management" in the 1970s when there was no coordination among the various functions of an organization, and each was committed to attain its own goal. This myopic approach then transformed into "integrated logistic management" in the 1980s that called for the integration of various functions to achieve a system-wide objective. Supply Chain Management (SCM) further widens this scope by including the suppliers and customers into the organisational fold, and coordinating the flow of materials and information from the procurement of raw materials to the consumption of finished goods.

Logistics involves getting, in the right way, the right product, in the right quantity and right quality, in the right place at the right time, for the right customer at the right cost. The logistic network consists of the suppliers, the retailer and the users. The purpose of an integrated logistic network in a supply chain is to fulfil customer orders through providing place utility to deliver products and services to end users. The place utility is achieved by managing a number of key functions of a supply chain. The functions include:

- Demand management
- Inventory management
- Transportation
- Warehousing
- Order processing
- Information Management

Logistics is a key enabler of supply chain collaboration. Improving performance in this field allows supply chains to increase their efficiency significantly and help to create innovations in different areas. In this context, an important task is to find structures and approaches which enable all types of performance management in logistics and supply chains for a better fulfilment of customer needs.

1.3 Objectives Of Logistics Management

Here are the top 10 objectives of logistics management

1. Improve Supply Chain Efficiency

Logistics management leads to greater visibility into the supply chain and fastens the inbound and outbound activities. It is extremely beneficial to reduce the overhead cost and allow delivery processes within the stipulated time. Managing inventory, Storage functionalities, and optimising warehouse operations can significantly enable businesses to better control costs and increase the overall efficiency of operations.

2. Inventory Management

Managing the inventory is an integral part of the smooth running of businesses. Identifying which and how much stock to order is useful to maintain the inventory levels and satisfy the end customers.

Therefore, inventory management tends to limit the risk of stock-outs. Also, decreasing inventory levels efficiently eliminates unnecessary costs and improves SCM operations.

3. Fulfils customer requirements

The main objective of logistics management is to execute proper planning on transportation modes and inventory available to satisfy the customers. This leads to a smooth freight moving process and timely delivery of products or goods. Logistics management allows customers to stay informed and enhances

the overall experience by providing them with relevant information. Analysing the customer's wants is the best way to build the synergic relationship and brand reputation of an organization.

4. Mitigate product damage

It is an additional cost to logistical expenses which can be caused due to improper logistical handling, absence of load unitising, incorrectly designed packaging, etc. An efficient logistics management strategy is needed to enable minimum product damage. Therefore, proper monitoring of all product movements is essential to fulfilling the objectives of logistics management.

5. Reduce Operational Cost

Embracing logistics management is the best way to drive up revenue and reduce the overall cost of the supply chain operations. It allows optimum utilisation of raw materials and faster delivery of products which help companies to gain a competitive advantage. However, streamlining a complex network of

operations and management of goods is useful in minimising the logistics cost. Controlling and managing the supply chain ecosystem with intelligent route planning can also enhance business productivity.

6. Quick Response

The main objective of logistics management is customer satisfaction. Solving the customer query and issues in the shortest time frame is an effective way to enhance the logistics strategy.

Therefore, it plays a crucial role in accomplishing timely delivery. Companies tend to operate reactively to each order as logistics management provides them with relevant information to intensify decision-making capability. This leads to rapid response and accuracy in the operation process.

7. Optimise delivery performance

Providing on-time delivery to the customers is extremely important as it helps to build long-term relationships with them. Consistency in delivery performance through proper planning and implementation can save a lot of time and resources. Companies get insights into the real-time updates and the exact location of the delivery vehicles. Getting control and visibility of the delivery processes is viable logistics strategy to meet customer expectations better.

8. Efficient Flow of Information

The integral part of logistics management is to strengthen the communication flow of internal business functions and external partners. Maintaining a clear communication network allows businesses to become agile and more responsive. One of the major objectives of logistics management is to facilitate collaboration. Therefore, establishing a seamless communication flow helps the companies to coordinate with vendors, suppliers, and customers.

9. Quality Assurance

The quality should be maintained throughout all facets of the logistics industry. Companies should take thoughtful efforts and always perform activities out of a supervisor's vision. Monitoring the quality of overall logistics operations by utilising new-age technologies can improve business growth. Quality assurance is considered to be one of the major aspects of the objectives of logistics management.

10. Reduce Carbon Footprint

A reliable logistic system tends to introduce new-age technologies for reducing carbon emissions. Undoubtedly, the transportation industry is considered to be the major reason for creating a negative impact on the environment as vehicles emit polluting gases. The objective of logistics management is to take measures for optimising routes, automation in workflow, and so on which help in setting a benchmark in green and sustainable logistics.

1.4 Components And Functions Of Logistics Management

Logistics comprises five essential components. Logistics companies are responsible for executing each one of these components to the highest degree of accuracy. Here are the five key components of any logistician's job.

1. Demand planning

To guarantee customer order fulfilment, demand planning is an essential logistics function. By ordering merchandise in the correct quantities and at the right price and mobilising suitable transport, customer demand is met and profits protected.

2. Storage and materials

Because demand is unpredictable, it's important to have surplus goods on standby until consumers demand them. Warehouses are responsible for the storage, care, retrieval, packaging, and unionisation of merchandise. Warehouse management systems (WMS) optimise storage capacities, equipment (forklifts, for example), retrieval speeds, and warehousing processes.

3. Inventory management

Inventory management controls the flow of goods in and out of a warehouse. It dictates how

much stock to hold and where to locate it using targeted data to predict consumer demand.

4. Transportation management

Logistics involves mobilising different modes of transport to move merchandise from one stage of the supply chain to the next. Merchandise might need to travel via road vehicles, freight trains, shipping, or even air travel for long-distance supply chains.

Consolidation is the process by which shipping companies or carriers combine multiple smaller shipments in one. This speeds up deliveries and keeps costs low.

5. Control

Logistics is a complex operational procedure that requires a lot of precise information to be effective. Forecasting demand, transportation times, and inventory are crucial to keeping the operations to a tight timescale.



Fig: 1.2 Logistics Management

Functions of logistics management

The five components of logistics help with the execution of key logistical functions. But on top of planning, storing and transporting, logistics encompasses numerous other very important operations. These include everything from network design to order processing and procurement to sustainability targets.

- **Design**
  Management professionals design precision logistics networks covering different locations that make up the supply chain. They optimise routes between manufacturers, warehouses, transportation service providers and final retailers to ensure an efficient service.
- **Orders**
  Logistics management also involves processing customer orders. And a lot of them, at that. Orders have to be received, sorted, filed, recorded, and then fulfilled promptly.
  Keeping this process reliable and efficient is an essential logistical function.
- **Procurement**
  For products to reach the shelves, someone has to deal with the raw materials. Logistics management involves obtaining high-quality raw materials from external suppliers and negotiating the best price for the manufacturer.

- **Reverse logistics**
  Reverse logistics plans and executes the reuse or proper disposal of products and materials. In short, this process works backwards to ensure excess or used merchandise is dealt with sustainably. Some companies even have sustainability targets for which it is the responsibility of logisticians to execute

1.5 Distribution Related Issues And Challenges

Logistics firms are the backbone of every industry in a country. Whether it's agriculture, manufacturing, or simply moving things, it is hard to imagine an economy without adequate logistics and transportation. Logistics play a critical role in promoting trade and ensuring smooth operations. However, as time passes, the evolutionary changes in technology, customer demand, and ever-changing legislation create more hurdles for even the largest logistics organizations.

1. Cost Savings On Transportation

This is the industry's one of the greatest difficulties, as transportation accounts for a sizeable portion of total logistics expenses. A key source of concern for logistics businesses worldwide is the rise in fuel prices, as they account for most of the increase in transportation costs. Increased fuel prices impose an additional surcharge on customers, effectively increasing the total shipping cost or freight charge for products and affecting revenue and earnings when fuel prices fall. Failure to cut costs results in an increase in expenses and, ultimately, losses for the business.

2. Enhancing Business Procedures

Keeping up with new advances in business procedures is another challenge for the logistics company. As new opportunities arise, it is in the best interest to adapt and adopt these changes to improve service and operational efficiency. According to a study, 36% of firms surveyed strongly agreed that they relied on their logistics partners to deliver cost savings and process improvements. This requires logistics partners to have the knowledge and experience to look beyond supply chain and operations to effect change throughout the framework of the entire procedure. Moreover, they should be financially stable, adaptable, and willing to take appropriate risks for long-term gain.

3. Improving Customer Service

Markets are dynamic and competitive nowadays, supply chains have grown complex and customer expectations have shifted. When clients place an order with the business today, they have higher expectations of delivery times and service quality. Customers expect their logistics partners to assist them in resolving issues and growing in a competitive climate. They demand tracking information and real-time updates on the status of their order throughout the shipment and delivery process.

Additionally, they want the option of paying for expedited freight, such as two-day or same-day delivery.

4. Relationships with Suppliers

Any logistics company's success depends upon its relationship with its suppliers. Businesses should continuously strengthen their relationship with their supplier, keeping them informed of their development and ensuring that the supplier is satisfied with their success. It is critical to develop, comprehend, and adhere to mutually agreed upon standards in order to gain a greater understanding of not only present performance but also areas for development.

5. Reverse logistics

Every e-commerce business requires reverse logistics. Customers return products they have purchased if they are unsatisfied, and the process should be seamless. Without an effective reverse logistics platform, you risk alienating customers and preventing them from making another purchase from you. However, implementing a reverse logistics plan can be difficult and costly without the proper support.

6. Shortage of Drivers

Driver shortages continue to be a major problem for logistics companies across the globe. Dealing with drivers and transporters are critical necessities that should be addressed with proper supply and demand management. One of the most effective ways for shippers to attract new drivers is to offer amenities that address the drivers' interests, requirements, and aspirations. Shippers can begin developing a more positive relationship by demonstrating the importance and necessity of drivers for the growth of the company.

7. Lack of Skilled Manpower

Numerous logistics sectors suffer from an increasing shortage of competent labour and specialised experts. With the advancement of modern technology, there is an increased demand for technically trained manpower. However, most labourers are under qualified, overworked, and lack the necessary skill sets to ensure the process is efficient. As a result, these businesses confront significant workforce turnover, increasing training expenditures, and underperforming human resource departments.

8. Government Regulations

Logistics companies should adhere to stringent laws set by federal, state, and local governments. Transportation legislation, norms, and security measures differ by region, and educating all company staff about these restrictions can be a significant burden. Additionally, these laws constrain the scope and autonomy of logistics firms and their ability to seek alternative viable options and prospects.

9. Environmental Regulations

The growth of transportation and logistics infrastructure requires a significant amount of space. As a result, carbon emission increases and the environment suffers. Reduced greenhouse gas emissions is a top priority for many logistics businesses, particularly in light of several studies demonstrating the negative impact of large industrial supply chains on the environment. Companies that adapt and decrease their carbon footprints succeed more than ever before, as both partners and consumers are more conscious.

10. Technological Barriers

While technology is critical to a logistics company's success and primarily benefits the industry, most businesses are faced with problems such as 'who will pay for it' and 'who will execute the technology advancements'. Responding to these questions is critical for logistics companies operating in developing and third world countries. Additionally, the cost of logistics technology is relatively high, with only the largest logistics organizations able to afford top-notch technology.

1.6 Gaining Competitive Advantage Through Logistics Management

Effective logistics management can provide a major source of competitive advantage. The bases for successes in the marketplace are numerous, but a simple model has been based around

the three C's – Customer, Company & Competitor. The source of competitive advantage is found firstly in the ability of the organization to differentiate itself, in the eyes of the customer, from its competition and secondly by operating at a lower cost and hence at greater profit.

Seeking a sustainable competitive advantage has become the concern of every manager who realizes the realities of the marketplace. It is no longer acceptable to assume that the goods will sell themselves. An elemental, commercial success is derived either form a cost advantage or a value advantage or, ideally both. The greater the profitability of the company the lesser is the cost of production. Also a value advantage gives the product an advantage over the competitive offerings. Successful companies either have a productivity advantage or they have a value advantage or maybe a combination of the two.

There are two main vectors of strategic direction that need to be examined:

1. Productivity Advantage

In many industries there will be a competitor who will be a low cost producer and will have greater sales volume in that sector. This is partly due to economies of scale, which enable fixed costs to spread over a greater volume but more particularly to the impact of the experience curve. It is possible to identify and predict improvements in the rate of output of workers as they become more skilled in the processes and tasks on which they work. Bruce Henderson extended this concept by demonstrating that all costs, not just production costs, would decline at a given rate as volume increased. This cost decline applies only to value added, i.e. costs other than bought in supplies.

Traditionally it has been suggested that the main route to cost reduction was by gaining greater sales volume and there can be no doubt about the close linkage between relative market share and relative costs. However, it must also be recognised that logistics management can provide a multitude of ways to increase efficiency and productivity and hence contribute significantly to reduced unit costs.

2. Value Advantage

It is a cliché that customers don't buy products they buy benefits. These benefits may be intangible i.e. they relate not to specific product features but to such things as image and reputation. Unless the product or service that we offer can be distinguished in some way from its competitors there is a strong likelihood that the marketplace will view it as a 'commodity' and so the sale will tend to go to the cheapest supplier. Value differentiation can be gained in numerous ways. When a company scrutinises markets closely it frequently finds that there are distinct value segments. In other words different groups of customers attach different levels of importance to different benefits. The importance of such benefit segmentation lies in the fact that often there are substantial opportunities for creating differentiated appeals for specific segments. Adding value through differentiation is a powerful means of achieving a defensible advantage in the market. Equally powerful as a means of adding value is service. Increasingly it is the case that markets are becoming more service sensitive and this poses a challenge in management of logistics. It is important to seek differentiation through means other than technology. A number of companies have responded to this by focusing upon service as a means of gaining a competitive edge. Service in this context relates to the process of developing relationships with customers through the provision of an augmented offer. This augmentation can take many forms including delivery service, after sales service, financial packages, technical support and so on.

In commodity market situations where a company's products are indistinguishable from their competitors' offerings the only strategy is to move towards being a cost leader or towards being a service leader. Often the leadership route is not available. This particularly will be the case in a mature market where substantial market share gains are difficult to achieve.

Cost leadership strategies have been based upon the economies of scale, gained through greater volume of sales. This is why market share is considered to be so important in many industries. This cost advantage can be used strategically to assume a position of price leader and make it difficult for high cost competitors to survive. This cost advantage can come through effective logistics management. In many industries logistics cost represents such a large part of total costs that that it is possible to make major cost reductions through fundamentally reengineering logistics processes.

The other way to come out of the commodity quadrant of the matrix is to seek a strategy of differentiation through service excellence. Customers ion all industries are seeking greater responsiveness and reliability from suppliers; they are looking for reduced lead times, just-in-time delivery and value added services that help them do a better job of serving their customers.

Gaining Competitive Advantage Through Logistics

A firm can gain competitive advantage only when it performs its strategically important activities (designing, producing, marketing delivering and supporting its product) more cheaply or better than its competitors.

Value chain activity disaggregates a firm into its strategically relevant activities in order to understand behaviour of costs and existing and potential sources of differentiation. They are further categorised into two types

(i) Primary: inbound logistics, operation outbound logistics, marketing and sales, and service

(ii) Support: infrastructure, human resource management, technology development and procurement To gain competitive advantage over its rivals, a firm must deliver value to its customers through performing these activities more efficiently than its competitors or by performing these activities in a unique way that creates greater differentiation.

Logistics management has the potential to assist the firm in the achievement of both a cost/productivity advantage and a value advantage. The under lying philosophy behind the logistics concept is that of planning and coordinating the materials flow from source to user as an integrated system rather than, as was so often the case in the past, managing the goods flow as a series of independent activities. Thus under a logistics management regime the goal is to link the marketplace, the distribution network, the manufacturing process and the procurement activity in such a way that customers are service at higher levels and yet at lower cost.

Transportation

Efficient transportation is important to the survival of a transportation and distribution service. Efficient transportation should be analysed for the best delivery route, as well as cost-effective packaging that ensures low investment and safety of goods.

Transportation services include the movement of goods and services, people, and animals from one location to another by rail, road, air, sea, cable, space, or pipeline. Transportation services can be divided into three different areas: infrastructure, vehicles, and operations. Transportation allows communication and trade between the two parties.

When planning the shipment process, the method of transportation is a significant consideration.

You need to determine the costs, how important is it to get the shipment to the end user in what period, the value of the goods as well as the size and weight of the goods.
Corlett Express deals with road fright which is one of the most common and used of all modes of transport. Road transportation has several advantages because of:

- Cost-effectiveness
- Quick and scheduled delivery
- Flexible service
- Track and trace of cargo and the truck
- Complete door-to-door services
- One of the most economical means of transportation for goods and services.

As new technologies are discovered and improved, there has been an enormous impact on transforming both the transportation industry as well as the logistics industry. Technology has allowed real-time monitoring of flow and resources and transparency across multiple points. Technology has provided a seamless exchange of operational information with key performance indicators that have streamlined and organised the industry.
In the highly competitive transportation and distribution service industry, it is imperative that information and physical products move with efficiency and at lower costs. Customers are demanding improved services that only technology can provide. Successful supply chain management and logistics are the difference between surviving and success in transportation and distribution services. As the supply chain management, logistics system is improved, immediate benefits can be seen in terms of lower transportation costs and optimise deliveries.

1.7 Functions of Transportation

The main function of transportation is to carry the products to different markets, which may be at different geographical locations. Apart from transporting the goods, the additional values that transportation provides to the customers are providing the products on time, in the quantities demanded, and in the undamaged form. The utility that transportation provides is called 'place utility' and the utility which is created by the storage is regarded as "time utility". Time utility cannot be provided to a customer without the help of transportation activities as the speed and the consistency by which a product is moved from one point to other is determined only by the transportation activities.
The activity of transporting something or someone from one point to other or the activities involved in being transported is termed as transportation. The various functions of transportation are discussed below:

1) Movement of Products:

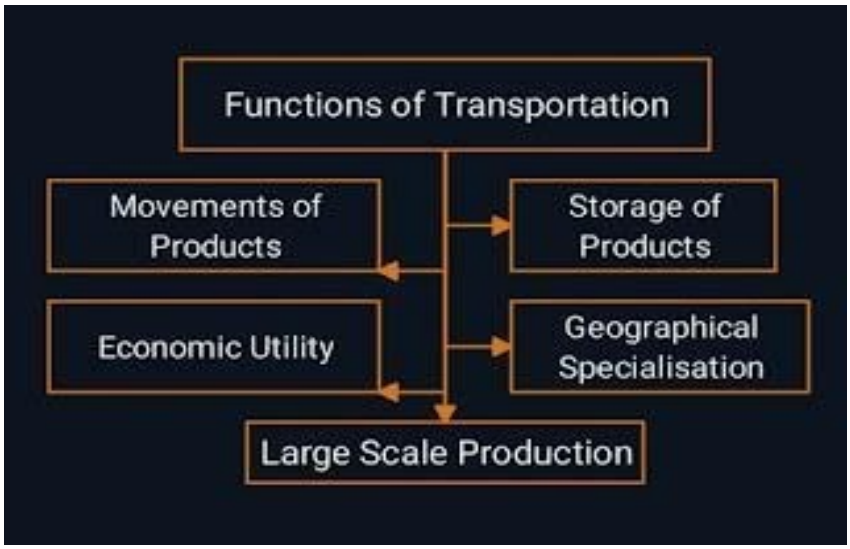
The fundamental function of transportation is to move the products from one place to another. The upward and downward movements of products in the value chain are facilitated by transportation. Transportation is important for moving the material to the next stage of manufacturing process and also closer to the customer. The material can be in the form of components, assemblies, materials, work-in- progress, finished products.

2) Storage of Products:

Storing the product in the vehicles for temporary purpose can be seen as another function of transportation. It can be seen as a costly source of storage but it is less expensive than the cost of unloading the material in a warehouse for few days and again loading it. Vehicles are used as

temporary storage facility because sometimes the need of storing the in-transit shipment, generally for few days, arises. Another situation where the transportation vehicle can be used as a storage facility is when the space in the warehouse is limited.

Fig:1.3 functions of transportation



3) Economic Utility:

As per the economic theories, creating place utility (right place) for the products, distributed and produced by the firm, can be seen as the main function of transportation. When the goods are placed where they are to be consumed, it is regarded as place utility. Apart from having the products at the right place, it is also important to have the product at the right time (time utility) and in right form (form utility). Moreover, the products should be owned by or in custody of the person who really wants to consume these products creating 'possession utility'. All the discussed utilities depend the efficiency and effectiveness of transportation.

4) Geographic Specialisation:

When the products are produced in that nation, region, or city which suits best as per the capital, talent, labour, raw material, and other resources of the company, it as regarded as 'geographic specialisation'. Some level of economic inefficiency can be resulted when such specialisation does not occur. In other words, when a certain region, nation, or city is not able to produce certain products because of its misfit with some of the factors then the extra resources and efforts need to be applied.

For example, if area A is specialised in product X then it needs to depend on other areas for fulfilling its need of things other than the product A.

5) Large-Scale Production:

In order to enable the large scale production, any firm will be requiring the collection of different types of raw material, spare parts, equipment, items from number of sources and from number of locations. Similarly, after producing the product it should be distributed to a large geographical market at a reasonable cost. Therefore, transportation is a very crucial element for carrying out a large-scale production.

1.8 Cost of Transportation

Transport systems face requirements to increase their capacity and reduce mobility costs, an objective that has seen continuous improvements in the last century. Users, such as individuals, corporations, institutions, or governments, must **negotiate** or **bid** for the mobility of passengers and freight. Capacity, distribution systems, tariffs, wages, locations, marketing, as well as fuel costs vary across geographies and in time. There are also costs involved in gathering information, negotiating, and enforcing contracts and transactions, often referred to as the cost of doing business. Trade also involves transaction costs, including customs duties, insurance and currency exchange, that all agents attempt to reduce since transaction costs account for a share of the resources consumed by the economy.

Frequently, corporations and individuals must decide how to route passengers or freight through the transport system. For passengers, this choice has been considerably expanded in the context of rising incomes and the availability of modes. For freight, the production of light and high-value consumer goods, such as electronics, and less bulky production techniques have expanded the locational choice of production and distribution. It is not uncommon for transport costs to account for **10% of the total cost of a product**. This share also roughly applies to personal mobility, where households spend about 10% of their income on transportation, including automobile ownership, which has a complex cost structure. Thus, choosing a transportation mode to route passengers and freight between origins and destinations is an important decision, which depends on several factors such as the nature of the goods, the available infrastructures, origins and destinations, technology, and their respective distances. Jointly, they
define **transportation costs**.

Transport costs are the costs internally assumed by the providers of transport services. They come
as fixed (infrastructure) and variable (operating) costs, depending on conditions related to geography, infrastructure, administrative barriers, energy, and how passengers and freight are carried. Three major components, related to transactions, shipments, and the friction of distance, impact transport costs.

Transport costs have significant impacts on the structure of economic activities as well as on international trade. Empirical evidence underlines that raising transport costs by 10% reduces trade volumes by more than 20%. The general quality of transport infrastructure can account for half of the
Variation in transport costs. In a competitive environment where transportation is a service that can be bid on, transport costs are influenced by the respective rates of transport companies, the portion of the transport costs charged to users.

Rates are the price of transportation services paid by their users. They are the negotiated monetary cost of moving a passenger or a unit of freight between a specific origin and destination. Rates are often visible to the consumers since transport service providers must provide this information to secure transactions. They may not necessarily express the real transport costs.

The difference between costs and rates for the service provider results in **a loss or a profit**. Rate-setting is a complex undertaking subject to constant change concerning the components defining transport costs. For public transit, rates are often fixed, and the outcome of a political decision where a share of the total costs is subsidised. Rate increases can be subject to the approval of the

regulatory agency. The goal is to provide affordable mobility to the largest possible segment of the population, even if this implies a recurring deficit (public transit systems rarely make any profit). It is thus common for public transit systems to have rates that are lower than costs and targeted at subsidising the mobility of social groups such as students, the elderly, or people receiving public assistance.

For freight transportation and many forms of passenger transportation (e.g. air transportation), rates are subject to **competitive pressure**. This means that the rate will be adjusted according to the complex interactions between supply and demand. They either reflect costs directly involved with shipping (cost- of-service) or are determined by the value of the commodity (value-of-service). Since many actors involved in freight transportation are private, rates vary significantly, but profitability is paramount, as transportation service providers cannot remain in service otherwise.

Components of the Transport Market

Transportation offers a spectrum of costs and service levels, which results in substantial differences across the world. The cost of a transport service includes the direct out-of-the-pocket money costs to the user, time costs, and costs related to possible inefficiencies and risk (e.g. unexpected delays).

However, economic actors often base their choice of transport mode or route on only part of the total transport cost. For example, motorists are biased by short-run marginal costs. They might narrow down the price of a specific trip by car to fuel costs only, thereby excluding costs such as tolls, depreciation, insurance, and vehicle tax.

Many shippers or freight forwarders are primarily guided by direct monetary costs when considering the cost factor in the modal choice. The narrow focus on direct money costs is, to some extent, attributable to the fact that time costs and costs related to possible inefficiencies are harder to calculate and often can only be fully assessed after the cargo has arrived. There are significant conditions affecting transport costs and thus transport rates.

a. Distance and time

The impacts of geography mainly involve distance and accessibility. Distance is commonly the most basic condition affecting transport costs. The more it is difficult to trade space for a cost, the more the friction of distance is important. It can be expressed in terms of length, time, economic costs, or the amount of energy used. It varies significantly according to the type of transportation mode involved and the efficiency of specific transport routes. Landlocked countries tend to have higher transport costs, often twice as much, as they do not have direct access to maritime transportation. The impact of geography on the cost structure can be expanded to include several rate zones, such as one for local, another for the nation, and another for exports.

The transport time component is also an important consideration as it is associated with the service factor of transportation. They include the transport time, the order time, the timing, the punctuality, and the frequency. For instance, a maritime shipping company may offer a container transport service between several North American and Pacific Asian ports. It may take 12 days to service two ports across the Pacific (transport time), and a port call is done every two days (frequency). To secure a slot on a ship, a freight forwarder must call at least five days in advance (order time). For a specific port terminal, a ship arrives at 8 AM and leaves at 5 PM (timing),

with the average delay being six hours (punctuality).

b. Type of product

The mobility of freight is cargo-dependent. Many bulky or perishable products require packaging and special handling. Coal is a commodity that is easier to transport than fruits or fresh flowers as it requires rudimentary storage facilities and can be transshipped using rudimentary equipment. Insurance costs are also considered and are commonly a function of the value to weight ratio and the risk associated with the movement. As such, different economic sectors incur different transport costs as they each have their own transport intensity. With containerisation, the type of product plays a limited role in the transport cost since rates are set per container, but products still need to be loaded or unloaded from the container.

For passengers, comfort and amenities must be provided, especially if long-distance travel is involved. These amenities have a cost but can also be a source of revenue, such as for retail and restoration.

Product differentiation takes the form of a segmentation of amenities and levels of comfort during travel. For instance, air travel is often segmented, in its simplest form, into business and economy classes.

c. Economies of scale and energy

The larger the quantities transported, the lower the unit transport cost. Economies of scale or the possibilities to apply them are particularly suitable for bulk commodities such as energy (coal, oil), minerals, and grains if they are transported in large quantities. A similar trend applies to container shipping, with larger containerships involving lower unit costs. For the transportation of passengers, economies of scale are salient for public transit systems. However, they are limited by the demand as the maximum-sized transport unit that can be assigned on a route cannot exceed the available demand without impairing its profitability.

Transport activities are large consumers of energy, especially oil. About 60% of all global oil consumption is attributed to transport activities. Transport typically accounts for about 25% of all the energy consumption of an economy. The costs of several energy-intensive transport modes, such as maritime and air transport, are particularly susceptible to fluctuations in energy prices since energy accounts to close to half their operating costs.

d. Empty backhauls

Many transport interactions involve empty backhauls since it is uncommon to have a perfect match between an inbound and a return trip. Commuting patterns involve imbalanced flows and empty return trips. For international trade, imbalances between imports and exports impact transport costs. This is especially the case for container transportation since trade imbalances imply the repositioning of empty containers that must be considered in the total transport costs. Consequently, if a trade balance is strongly negative (more imports than exports), transport costs for imports tend to be higher than for exports. Significant transport rate imbalances have emerged along major trade routes. The same condition applies at the national and local levels, where freight flows are often unidirectional (e.g. from a port terminal to a distribution centre), implying empty backhaul movements.

e. Infrastructures and modes

The efficiency and capacity of transport modes and terminals directly impact transport costs. Poor infrastructures imply higher transport costs, delays, and adverse economic consequences.

More developed transport systems tend to have lower transport costs since they are more reliable, connected, and can handle more movements.

Different transport costs characterise different modes since each has its own capacity limitations and operational conditions. A core aspect concerns the suitability of modes according to the distance involved and the nature of what is being carried. When two or more modes are directly competing for the same market, the outcome often results in lower transport costs and the development of niches. Containerised transportation significantly reduced freight transport rates worldwide by allowing relatively small transport units (containers) to be carried in massified loads.

f. Competition, regulation, and subsidies

Transportation involves a complex competitive and regulatory environment. Transport services taking place over highly competitive segments tend to be of lower cost than in segments with limited competition (oligopoly or monopoly). International competition has favoured concentration in many segments of the transport industry, namely maritime and air modes. Regulations, such as tariffs, cabotage laws, labor, security, and safety impose additional transport costs, particularly in developing economies.

If the infrastructure is expensive to develop and maintain, this cost should be reflected in fares to cover the amortisation of the asset. Publicly available roads are a form of cross-subsidy since they offer their users free infrastructure. Still, freedom of access can be misleading as sales and fuel taxes are paid by users and these funds are used for road infrastructure construction and maintenance. If a government or a corporation uses other sectors of its activities to subsidise the full costs of transport infrastructure, then this cross-subsidy is having an impact on its costs. Taxes and tolls are commonly used to cross- subsidise public transit.

g. Surcharges, taxes and tolls

Surcharges refer to an array of fees, often set in an arbitrary fashion, to reflect temporary conditions that may impact the costs assumed by the transporter. They also take place when fares are regulated, leaving the operator to find alternative sources of revenue. Fuel surcharges, security fees, geopolitical risk premiums, and additional baggage fees are most common. The passenger transport industry, particularly airlines, has become dependent on a wide array of surcharges as a source of revenue for operators. Yield management is another form of surcharge where a transport service provider changes its rate according to fluctuations in demand.

Transport activities are often taxed, such as vehicle sales taxes and registration fees. Fuel taxes are the most significant form of taxation levied by governments, with revenues often used to cover maintenance and infrastructure investment costs. Tolls are also commonly levied on the usage of transportation assets, particularly at bottlenecks such as bridges and tunnels.

3. Types of Transport Costs

Mobility is influenced by transport costs. Empirical evidence for passenger vehicle use underlines the relationship between annual vehicle mileage and fuel costs, implying the higher fuel costs are, the lower the mileage. At the international level, the doubling of transport costs can reduce trade flows by more than 80%. The more affordable mobility is, the more frequent the movements and the more likely

they will take place over longer distances. Empirical evidence also underlines that transport costs tend to be higher in the early or final stages of a movement, also known as the first and the last

mile. A wide variety of transport costs can be considered.

Terminal costs - Costs that are related to loading, transshipment, and unloading. Two major terminal costs can be considered; loading and unloading at the origin and destination, which are unavoidable, and intermediate (transshipment) costs that can be avoided. For complex transport terminals, such as ports and airports, terminal costs can involve various components, including docking/gate fees, handling charges, and pilotage/traffic control fees.

Line haul costs - Costs that are a function of the distance over which a unit of freight or passenger is carried. Weight is also a cost function when freight is involved. They include labor and fuel and commonly exclude transshipment costs.

Capital costs - Costs applying to the physical assets of transportation, mainly infrastructures, terminals, and vehicles. They include the purchase or major enhancement of fixed assets, which can often be a one-time event that can be amortised over several decades. Since physical assets tend to depreciate over time, capital investments are required on a regular basis for maintenance.

Transport providers make various decisions based on their cost structure, a function of all the above transport costs. This involves the transmission of information that takes the form of documents and terms for transactions involving the transportation of passengers and goods. Specific

commercial transportation terms have been set to simplify transactions and identify the respective responsibilities. While the transport rate plays an important role in the modal choice, firms using freight transport services are not always motivated by cost minimisation. They often show “satisfying behavior” whereby the transport costs need to be below a certain threshold combined with specific requirements regarding reliability, frequency, and other service attributes. Such complexities make it more difficult to assess the role of transport rates in the behavior of transport users, particularly for supply chains where transport costs are a small share of the market value of the end product.

The role of transport companies has increased in the general context of global commercial geography. Maritime shipping companies, air carriers, and logistics service providers have become multinational corporations. However, the nature of this role is changing due to a general reduction of transport costs but growing infrastructure costs, mainly due to greater flows and competition for land. Each transport sector must consider variations in the importance of different transport costs. While operating costs are high for air transport, terminal costs are significant for maritime transport. Several indexes, such as

the Baltic Dry Index, have been developed to convey a pricing mechanism useful for planning and decision making, particularly concerning future expectations. Relations between terminal operators and carriers have thus become crucial, notably in containerised traffic. They are needed to overcome the physical and time constraints of transshipment, notably at ports.

Technological improvements and their associated decline in transport costs have weakened the links between transport modes, terminals, and economic activities. With lower transportation costs, there is more locational flexibility as long as transportation networks remain accessible. There is less emphasis on heavy industries and more importance given to manufacturing and transport services such as warehousing and distribution. Indeed, new functions are being grafted to transport activities facilitating logistics in and manufacturing processes. The standard notion of transportation costs is being expanded towards logistics costs, which are more extensive to

include inventory carrying costs as well as the combination of modes necessary for a complex movement to occur.

The requirements of international trade gave rise to the development of specialised and intermediary firms providing transport services. These are firms that do not physically transport the goods but are required to facilitate the grouping, storage, and handling of freight, as well as the complex paperwork and financial and legal transactions involved in international trade. Examples include freight forwarders, customs brokers, warehousing, insurance agents, and financial institutions. Recently, there has been a trend to consolidate these different intermediate functions. A growing proportion of global trade is now being organised by multi-national corporations that are offering door-to-door logistics services. They are defined as third-party logistics providers.

Mode of Transportation

Rail, highways, water, pipeline, and air are the five main modes of transportation. Apart from these the recently emerged forms of transportation are package carrier, ropeways, and inter-modal system.

Traffic volume, revenue, system mileage, and the nature of traffic composition are the factors that can be used to determine the comparative significance of each mode. With respect to these measures, each mode of transportation is explained below:

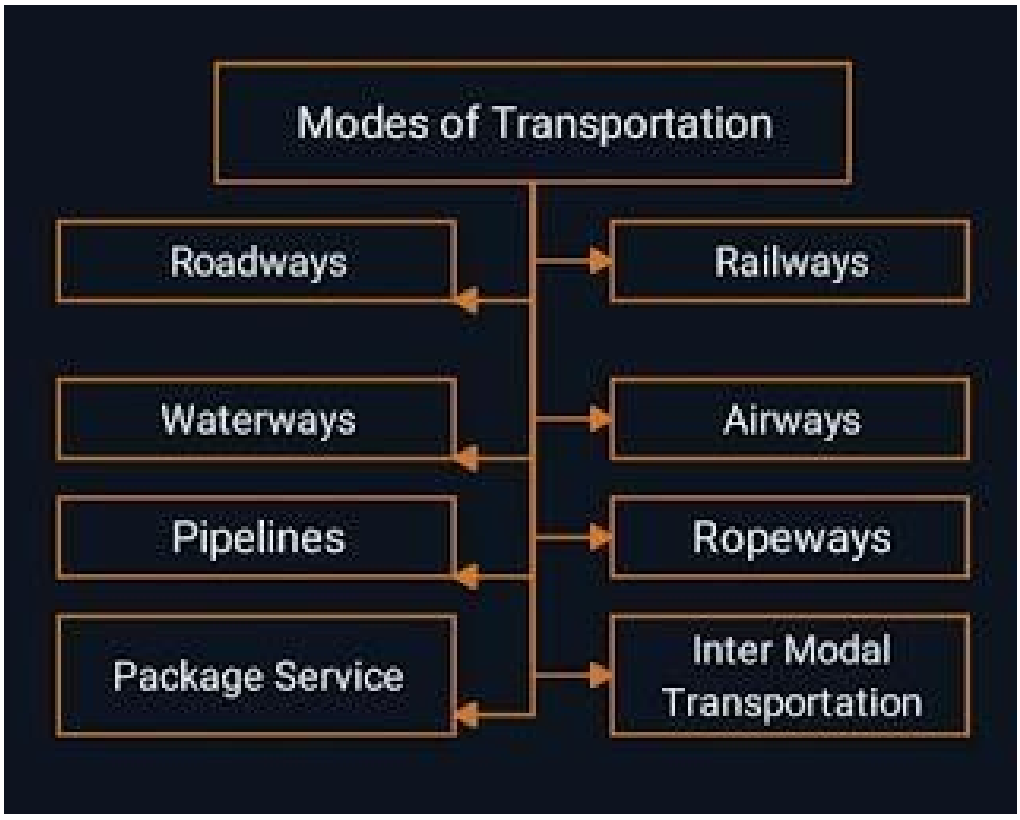


Fig: 1.4 Modes of transportation

1. Roadways:

For the agricultural and industrial development of any nation, the most important mode can be seen as the road transport. This method is quite useful in reaching to short and medium distances, even to those places where other modes of transportation do not have their reach. The facility of

door-to-door service, which is not possible by other modes, is provided by road transport. In order to bring the trade from the remote and rural areas to the urban and semi-urban areas, road transportation can be used. With the help. of road transportation the basic infrastructure can be built to ensure the connectivity of far-off villages with the rest of the nation. Because of the increased demand and a huge development in industrial and agricultural sector, the significance of road transportation is quite vital for making the product available at the place and time of consumption. In the transport network of the country, the role of road transportation is quite dominant.

2. Railways:

One of the principal carriers of men and material in the country is railways which plays a very significant role in the trade and commerce activities of the country. It supplies essential commodities. to different locations by transporting across the length and breadth of the country. The industrialisation and development of many nations have been carried forward with the help of railways. During the initial phase of industrialisation many countries were depending upon the railways as it was the main source of transportation which was available for moving the raw material and finished products from one place to another. Chemicals, heavy material, farm products, automobiles, and also the low value products are transported by railways. They have greater efficiency in case of truckloads which can be shipped at a relatively cheaper price through railways in comparison to smaller modes of transportations. A relatively lesser handling is required in transporting the goods through railways. In order to facilitate easy loading and unloading of material, different firms establish their facilities near to the rail lines.

3) Waterways/Sea :

In order to ship heavy, non-perishable, and low value goods (such as coal, grain, ore, and petroleum products), the cheapest mode of transportation can be seen as waterways. There is a huge capacity in case of water carriers. Products weighing a minimum of ten times the weight of one rail car can be transported by waterways powered by towboats, tugboats, barges which move in inter coastal canals and inland rivers. In fact, the vessels which run in oceans can have thousands of containers. There are a number of markets which are not connected with the waterways without the use of railroad or trucks. The waterway shipping industry is segmented into various parts which are as below:

Dry bulk carries, container ships, tankers, and special vessels are included in the shipping fleet around the world. In India, approximately 32% of the total GRT (Gross Registered Tonnage) of the shipping fleet is contributed by the dry bulk carriers and 33% of total fleet is accounted by the tankers.

4) Airways:

Among all the other modes of transport, the least hazardous mode can be considered as the airways. The cost of air transportation is quite high; thus, it is mainly used for the transportation of high valued perishable products with limited life span. The facility of air cargo is mainly concentrated near the gateway airports e.g, Delhi, Mumbai, Kolkata, Chennai, and Bangalore. About 87% of the total air cargo is handled by these airports in India. Anticipating the growing needs of cargo airways and passenger airways, the Government of India is inviting the interested private players in the air transport services and its associated services such as airports.

5) Pipelines:

The use of pipeline for transportation of petroleum was first done by Samuel Van Syckel in the year 1870 in Pithole, Pennysyivania. The face of transportation was changed after twenty years by Standard Oil Company of North-Western Pennysylvania. The pipeline transportation was first use for transporting the petroleum but its scope is enhanced by using it for transporting many commodities such as coal in slurry form, chemicals, natural gas, iron ore fines in slurry form, etc. Although the initial cost of setting up the network of pipelines is quite high but later it helps in reducing the operating costs. Almost all public and private sector petroleum refineries use the pipelines for the transportation of petroleum products.

These can be thought of as the most automated mode of transportation which mainly carries the products of a shipper as it belongs only to a certain shipper. Mainly chemicals or petroleum products are transported by the pipelines. There are numerous environmentalists who have. their concerns regarding the effect of pipeline on the environment such as harm to plants and animals due to installation and leaks.

6) Ropeways:

Out of the total geographical area of India, over 16% is comprised of hilly locations. The problem of transportation is quite prominent in these locations due to the long circuitous paths. Sometimes, the transportation of essential commodities and other materials is quite vital due to their strategic significance in the defence programs of the nation. Ropeways can be seen as the economical and faster mode of transportation in the hilly areas, especially when the oil shortage is going on. The various merits of ropeways are as follows:

- Lesser harm to the ecology.
- Shorter routes can be used to reach to the remote hilly locations.
- The cost of ropeway transportation is lesser than the other modes.
- Over short distance, thee transportation of bulky products is quite fast.

7) Package Service:

The country, in last few decades, has faced a huge problem related to the availability of transportation for small-shipments. Due to the different costs associated with the terminal and line haul operations, the small-shipment service providers charged quite high prices. The providers cannot decrease the prices as different overheads impose certain minimum charges on them irrespective of the size of shipment and the distance of destination. Due to such obstacles, some private companies realised the potential of specialised services for package-service or small-shipment market.

8) Inter-modal Transportation:

Taking the economic advantages of two or more modes of transportation by combining them with each other to facilitate the transportation service at a least possible total cost is known as inter-modal transportation. In order to combine the various modes of transportations, various efforts are carried out over the years. The concept of inter modal transportation is not a new concept, it has originated during the early years of 1920s but in order to control the monopoly practices, different restrictions were imposed on the cooperative practices. During 1950s, this mode started gaining popularity as the advantages of road and rail transportation were combined to fora an inter-modal transportation known as piggy back service. The flexibility of motor or road transport for low distances and the low line-haul cost of rail for longer distances were combined to form this common inter-modal transportation. In order to gain the higher efficiency

and effectiveness of transportation, the popularity of inter-modal transportation has increased significantly in recent years

1.9 Network And Decisions

Economic uncertainty, fluctuating fuel prices, increased safety and social regulation, escalating customer expectations, globalization, improved technologies, labor and equipment shortages, a changing transportation service industry…today's managers are faced with an array of challenges and opportunities that contrast dramatically with those of a decade ago.

It is not surprising, then, that many managers have failed to fully adapt to the changing environment, resulting in performance shortcomings and lost opportunities. Prominent among the list of lost opportunities is fully leveraging the transportation function as a critical strategic element within the supply chain.

Transportation plays a central role in seamless supply chain operations, moving inbound materials from supply sites to manufacturing facilities, repositioning inventory among different plants and distribution centres, and delivering finished products to customers. Benefits that should result from world-class operations at the points of supply, production, and customer locations will never be realised without the accompaniment of excellent transportation planning and execution. Having inventory positioned and available for delivery is not enough if it cannot be cost effectively delivered when and where needed.

Long-Term Decisions

At the highest strategic decision level, transportation managers must fully understand total supply chain freight flows and have input into network design. At this level, long-term decisions related to the appropriateness and availability of transportation modes for freight movement are be made. Managers need to decide, for example, which primary mode of transportation is appropriate for each general flow (i.e., inbound, inter-facility, outbound) by product and/or location, paying careful attention to consolidation opportunities where feasible.

Plans should indicate the general nature of product flows, including volume, frequency, seasonality, physical characteristics, and special handling requirements. Strategic mode and carrier-sourcing decisions should be considered part of a long-term network design, identifying core carriers in each relevant mode to enhance service quality commitments and increase bargaining power. Additionally, managers need to make decisions regarding the level of outsourcing desired for each major product flow—ranging from providing the transportation through the company's own assets (e.g., private fleets) to latch-key turnover of transportation operations to third-party providers.

Network and lane design decisions at the strategic level should examine tradeoffs with other operational cost areas such as inventory and distribution centre costs. In conducting this analysis, companies should keep in mind that networks need not be fixed or constant. Rather, substantial service improvements and cost reductions can be achieved by critically examining existing networks and associated flows. For instance, it may become apparent that stock locations can be centralised by using contract transportation providers to move volume freight to regional cross-dock facilities for sorting, packaging, and brokering small loads to individual customers.

Lane Operation Decisions

The second level of decision-making regards lane operation decisions. Where network design decisions are concerned with long-term planning, these decisions focus on daily operational

freight
transactions. At this level, transportation managers armed with real-time information on product needs at various system nodes must coordinate product movements along inbound, inter-facility, and outbound shipping lanes to meet service requirements at lowest total costs. Decision-makers who are adept at managing information can take advantage of consolidation opportunities, while ensuring that products arrive where they are needed in the quantities they are needed just in time to facilitate other value-added activities. At the same time, they are realising transportation cost savings.

The primary opportunities associated with lane operation decisions include inbound/outbound consolidation, temporal consolidation, vehicle consolidation, and carrier consolidation. If managers have access to inbound and outbound freight movement plans, they can identify opportunities to combine freight to build volume shipments. An inbound shipment may arrive from a supplier located in Philadelphia, for example, on the same day that a production order destined for a customer in Wilmington, Del., becomes available for movement. If this information is known to transportation planner's far enough in advance, arrangements could be made for the inbound carrier to haul the outbound load back to Wilmington.

In many cases the inbound carrier would be willing to negotiate lower roundtrip rates to avoid deadhead miles on the backhaul. This is particularly true if the carrier and/or driver are headquartered in the Philadelphia area. If this happens to be a heavy traffic lane, the firm may consider strategically sourcing a core carrier in this geographic region to capitalise on this opportunity.

Similarly, less-than-volume-load (LVL) shipments moving to the same geographic region on consecutive days may be detained until sufficient volumes exists to justify a full load on one carrier with multiple stops (temporal consolidation). By avoiding the LVL terminal system, the detained freight often arrives at the same time or earlier than the original LVL shipment—and at a lower cost. Multiple, small shipments inbound from suppliers or outbound to customers in the same geographic region scheduled for delivery on the same day may also be combined on one vehicle at full-volume rates, paying stop-off charges but saving on multiple LVL rates (vehicle consolidation).

Another consolidation opportunity springs from the core carrier concept. Assigning greater shipping volumes to fewer carriers should result in lower per-unit transportation costs and higher priority assigned to the shipper’s increased freight. In addition to consolidating the carrier base, the shipper can identify reliable carriers in need of backhaul miles.

For instance, a plastics distributor identifies carriers that operate a high percentage of deadhead miles in lanes over which the firm regularly moves freight. The firm negotiates advantageous rates with these carriers in exchange for guaranteed backhaul revenue miles. If the plastics firm plans to move significant amounts of product from Texas to Florida, the transportation manager will find a Florida carrier that moves a large volume of product from Florida to Texas. Given sufficient planning information, the transportation manager can use guaranteed volumes on the backhaul to negotiate attractive rates.

Choice of Mode and Carrier

A third level of transportation decision-making involves the choice of mode and carrier for a particular freight transaction. Due to the blurring of service capabilities among traditional

transportation modes, options that in the past would not be considered feasible may now emerge as the preferred choice. For example, rail container service may offer a cost-effective alternative to long haul motor transport while yielding equivalent service. Similarly, package delivery carriers are competing with traditional LTL operators. Truckload carriers, on the other hand, are increasingly bidding for low-volume shipments as well as for overnight freight movements. For the shipper seeking 24-hour delivery, truckload carriers may offer an alternative to air carriers at significantly lower rates—and, quite possibly, higher reliability. In an integrated mode/carrier decision-making scenario, each shipment would be evaluated based upon the service criteria that must be met, (for example, delivery date/time or special handling requirements) as well as the movement's cost constraints. All core carriers, regardless of mode, that could possibly meet the service and cost criteria would be pulled from the database. Managers would then choose the carrier from this multi-modal set based on availability and existing rates.

Dock Level Operations

The final set of transportation decisions involves dock level operations, such as load planning, routing, and scheduling. These activities encompass the operational execution of the higher-level planning decisions. While the fundamental purpose of shipping docks may not have changed much over the years, the manner in which work is done certainly has. One obvious change is the common usage of advanced IT and decision support systems. These tools help the dock personnel to make better use of the transportation vehicle space; to identify the most efficient routes; and to better schedule equipment, facilities and drivers on a given day.

Transportation departments that avail themselves of better and more timely information can derive significant benefits from more efficient and effective load planning, routing, and scheduling. For example, if a vehicle is being loaded with multiple customer orders, dock-level managers must ensure that the driver is informed of the most efficient route and that loads are placed in the order of the planned stops. Transportation managers, even at the dock level, must develop expertise in using the information tools available to aid in these decisions.

Successful managers today require a broad view of transportation management's role and responsibilities in an integrated supply chain. Managers will continue to encounter significant challenges as their firms proceed down the road toward supply chain integration, particularly as external environmental characteristics such as fuel costs and the overall economy wax and wane.

1.10 Containerisation

Containerisation means the increasing use of the containers as a support for freight transportation. It involves processes where the containers are increasingly used because it either substitutes cargo from other means of transport or it is adopted as a mode supporting freight distribution, the reason being that a large number of transport systems are able to handle containers. Both inter modal transportation and containerisation are mutually connected, self-strengthening and depend on a set of driving forces linked with technology, infrastructures and management. One of the major issues were the different sizes and dimensions of containers used by shipping lines, which were a source of much confusion in compiling container shipping statistics. The loading could involve different volumes since different box sizes were involved. The usage of containers has helped in a faster movement and a standardisation of loads. The container has substantially contributed to the adoption and diffusion of inter modal transportation which has led to a lot of changes. Through reduction of handling time, labor costs,

and packing costs, container transportation allows a considerable improvement in the efficiency of transportation. Thus, the importance of containers is not what they are but what they enable. A major change in freight transportation could not have taken its current form without containerisation. It can be rightly said that the maritime sector should have been the first mode to pursue containerisation. It was the means of transport less used because of the time taken to load and unload the vessels.

Containerization permits the mechanized handling of cargoes of different types and sizes that are placed into boxes of standard sizes. Thus goods that took days to be loaded or unloaded from a ship can now be handled in a matter of minutes. Containers are either made of steel (the most common for maritime containers) or aluminium (particularly for domestic) thus helping in the flexibility. Another reason for greater movement of the container is through the implementation of International Standards Organization (ISO) within 10 years of its introduction. Because of this, large container sizes and specifications have been put in use. The most commonly used container size is however the 40-foot box, which in its 2,400 cubic feet which carry on average 22 tons of cargo. However, transporting cargo in a 20 ft container is usually 80% of the cost of transporting cargo in a 40 ft container because irrespective of the size a 20 ft container requires the same amount of inter modal movements even if it takes about
half the space. A significant share of international containers is either owned by big shipping lines. In few countries, a large amount of domestic containers of 53 foot are also used. Double stacking of containers on railways (COFC: Containers On Flat Cars) has doubled the capacity of trains to haul freight with minimal cost, thereby improving the competitive position of the railways with regards to loading freight for long-haul shipments. The maritime containers are used in international trade, and other types of containers are found in the airline industry. Increased labor costs and the slowness of loading, that require a very rapid turnaround, made the industry very receptive to the concept of a loading unit of standard dimensions designed to fit the specific shape. Containerisation is hailed as one of the greatest innovations in the goods transportation industry. Ever since the American entrepreneur Malcolm Maclean came up with the first container made of corrugated steel in 1955, the container has evolved from the humble corrugated steel box to the present-day super-efficient intermodal container.

Such containers can be transported by ships or over the land on trucks or railways.

Intermodal containers are heavy-duty boxes of standard sizes made of Corten steel – a special steel alloy that can withstand corrosion and other harsh elements of nature. Shipping containers, as they are commonly called, can be safely locked and sealed using special container seals for transport by sea or land.

Intermodal containers come in standard sizes of 20', 40', and 45' and therefore can be handled by standard container handling equipment such as cranes or heavy-duty lifts. A standard 20' container can carry about 28200 KG in weight or roughly 33 CBM. A 40' container can hold 28800 KG weight of goods or about 67 CBM. The 45' high cube container has a lesser weight carrying capacity of 27600 KG while it can take about 85 CBM in volume.

Containerized goods can be transported overland by standard trucks with trailer beds. Special temperature-controllable containers called refrigerated containers or reefers are used extensively to transport items that are temperature sensitive.

While containerisation is no doubt very useful for the transportation of goods between different

locations by different modes of transport, they do have some disadvantages. Let us take a look here at some of the main advantages and disadvantages of containerization

Advantages of Containerisation Flexibility

Containers can transport a very large variety of goods ranging from food grains or food products to machinery. Out-of-Gauge cargo (OOG) can be easily transported on flatbeds or platform containers. Cargoes that are of abnormal sizes and shapes that do not fit into the normal containers are called OOG cargo. Specially constructed containers called Reefers (Refrigerated Containers) can carry those items that are sensitive to temperature variations such as pharmaceutical drugs and perishable food items.

Typically, it consists of an insulated container fitted with a portable refrigeration unit. The temperature inside a refrigerated container can be set according to the requirements of the item that it carries. a flexi tank is a sturdy container with a large, durable, and flexible bag inside that can be filled with any non- hazardous liquid cargo for transport. Flexitanks are used to transport certain liquid cargo in bulk such as wines, latex, edible oils, etc.

Ease of Management

Management of container cargo or FCL (Full Container Load) is easier than handling other methods of transporting goods such as by Less-than Container Loads (LCL).

Shipping containers are indivisible units and each registered container has a unique identification number making it easy to track and trace it during a voyage. This unique number called the container number is given to it following specifications of the Bureau International des Containers (BIC). The BIC is an organization based in Paris that 'oversees standards for intermodal containers'.

The container number is used in the verification of cargo by various parties such as the shipper, the receiver, ports and customs authorities, etc.

Speed of Transportation

With bigger and more powerful cargo ships and modern container handling equipment, transhipment times have reduced drastically. Loading and unloading are faster these days, at ports as well as at modern warehouses.

Standardised MHE (Material Handling Equipment) makes it easier to handle shipping containers coming from and going to different parts of the world.

Economies of Scale

The cost of transporting goods by containers is said to be 20 to 25 times less than the cost of transporting the same goods as loose bulk or LCL. Containerisation has drastically brought down the transport cost element in the pricing of goods.

Economies of scale is a major factor here. In general, economies of scale is the advantage companies get as a result of producing or dealing in bulk.

Durability

Depending on the usage, a shipping container can last for 10 to 25 years. Once they are condemned after it is no longer usable, containers are often used for storage or converted as living quarters.

Empty containers are used as temporary storage space by warehouses and distributers especially when their storage facility has reached its capacity. Containers can be placed in any convenient

location in the warehouse yard. It provides temporary and flexible storage for companies when required.

The practice of refurbishing and using old containers as living quarters is gaining popularity the world over. It is inexpensive to set up while at the same time they look stylish when done properly and aesthetically.

Safety and Security

Intermodal containers are safe and secure. These heavy-duty boxes are walled on all five sides except one end where the double doors are located. These double doors have double lock-rods each, that are used to lock and seal the container making it safe and tamper-proof.

Standardisation

Since ISO-certified containers are of standard size and dimensions they can be handled universally by any standard transport and MHE. This makes it easier to use, transport, and store the containers **Disadvantages of Containerisation**

Space Constraints

Containers, whether carrying cargo or empty, take up a lot of space. Terminals need to have enough stacking space to accommodate containers that come in and go out of it. Containers that must go out first must not be at the bottom of a stack.

To put this into perspective, the largest container ship today – HMM Algeciras, can carry about 24,000 TEU. Large container ships need more draft or depth, with the above ship taking up close to 55 feet! The latest container handling equipment and other infrastructure have to be in place to ensure minimum port turnaround times for cargo ships. Besides a favourable location, a container terminal needs to take all these into considerations.

Infrastructure Costs

The latest dockside gantry cranes and other terminal equipment cost several million US dollars. Leading ports and terminals are those that can make these investments and also keep the equipment upgraded according to advances in technology.

While developed nations can make such investments others may find it difficult to keep up with the race.

Container Management Failure

Management of containerised cargo depends on timely receipt and processing of information. An effective terminal management software ensures effective management of all the information that is necessary for the successful running of a terminal. Cutting corners here can have disastrous consequences.

Re-positioning of Empty Containers

Containers that come in with cargo are unloaded and eventually moved to the designated stack for empty containers at their destination. Shipping companies need their empty containers to be available where there is demand. Hence, empties (empty containers) have to be relocated in a timely manner to the desired locations.

We must remember that a container whether full or empty requires the same space, both at storage, as well during transhipment. Unless empty containers are moved out of empty container yards to destinations where they can be put to use, it would result in demand-supply imbalance leading to a shortage of containers for shipments.

Large sums of money are spent by shipping companies to reposition their empty containers.

Smuggling

Smuggling of contraband such as arms, drugs, and even human trafficking happens through containers. Typically, customs authorities the world over inspect containers at random. It is possible that contraband can sometimes slip through.

Other reasons that prompt the authorities to inspect certain containers are tip-offs, irregular documentation, suspicious patterns of shipping goods, etc.

Customs in developed countries use X-ray scanners that can scan containers.

Notwithstanding drawbacks, experts have forecasted a growth rate of 3 – 4% for containerised cargo in the next three years. This comes as welcome news for the cargo shipping industry after the beating it took in the last year due to the Coronavirus pandemic.

1.11 Cross Docking

The speed and efficiency of an inventory network have become significant factors of development for associations. Cross docking services are only one system that can be executed to help accomplish an upper hand. Carried out fittingly and in the right conditions, cross docking can give massive upgrades in productivity and dealing with times.

Cross docking services can allow you to transport merchandise quicker and diminish warehousing costs. This is because cross docking includes conveying items from producers straightforwardly to the objective with practically zero stockpiling time. Besides, this helps decrease the odds of item harm and stock loss, as it includes insignificant treatment of merchandise.

Let's dig in to know more about cross docking!

What are cross docking services?

Cross docking services are coordination techniques where items from a provider or assembling plant are conveyed straightforwardly to a client or corporate store with minor to no taking care of or capacity time. Cross docking happens in a dissemination docking terminal, typically consisting of trucks and dock entryways on two (inbound and outbound) sides with little extra room. The name 'cross docking' clarifies the way toward accepting items through an inbound dock and afterward moving them across the dock to the outbound transportation dock.

Cross docking is a high-level yet proficient coordination arrangement, which offers numerous benefits for your organization. By utilising our cross-docking services and allowing us to deal with a piece of your organizations arranging assignments, you set aside both time and cash. Moreover, it gives you the choice of controlling your organizations whole store network from maker to end client.

In straightforward terms, inbound items show up through transportation like trucks/trailers and are dispensed to a getting dock on one side of the 'cross-dock terminal. When the inbound transportation has been docked, its items can be moved either straightforwardly or by implication to the outbound objections; they can be dumped, arranged, and screened to distinguish their end objections. In the wake of being arranged, items are moved to the opposite finish of the 'cross dock' terminal through a forklift, transport line, bed truck, or other transportation methods to their ordained outbound dock. When the outbound transportation has been stacked, the items would then be able to advance toward clients.

Types of cross docking services

The expression “Cross Docking” has been utilised to portray various sorts of exercises, including the fast assortment and transportation of items. Napolitano (2000) proposed the accompanying grouping of cross docking:

Manufacturing cross docking:

Support and gather input sources to help the schedule underway. For instance, a producer may lease a distribution centre close to their manufacturing plant and use it to get ready for collecting or assembling the vital segments of each part. Since every element’s requirements are known ahead of time, in light of the yield of an MRP (production resource planning system), there is no compelling reason to keep a specific measure of stock.

Distributor Cross Docking:

Collecting input items from various providers into a bed of blended things. This bed will be conveyed to the client when the last segment is gotten. For instance, PC parts can source various providers’ components and join them into a solitary shipment for clients.

Transportation cross docking:

This movement joins shipments from various LTL (Less-Than-Load: a shipping service for relatively small loads or quantities of freight) structure transporters or in little bundles for monetary benefits of scale (Economies of scale).

Retail cross docking:

This cycle includes taking items from numerous providers and arranging them into yield trucks for various retail locations.

Opportunistic cross docking:

Can be utilised in any distribution centre, moving an item straightforwardly from the getting region to the transportation territory to meet a referred to need, for example, a solitary request Customers’ organization

When to utilise cross docking services

Cross docking is a cycle that empowers organizations to move items from one truck (or railcar) to another car. This happens at a cross docking stockroom. However, the items might be put away, or a brief timeframe – or capacity might be skipped by and large. In the same way as other coordination arrangements, cross docking can address a broad scope of issues. Here are the absolute generally normal:

#1. Your conveyance will be early or late

Suppose your items are being conveyed to a significant retailer. However, your driver will be at any rate one day ahead of schedule. You can destroy the driver’s profitability by basically having that person stand by. Or then again, you can get that driver back out and about by conveying to a cross docking supplier that can store the item incidentally and share at the delegated time. Similar remains constant when a driver is late for an arrangement as the supplier can perform capacity, rescheduling/coordination with the retailer, and conveyance for your benefit.

#2. Your merchandise is showing up on a holder

The cross docking services are included for QVC (Quality, Value & Convenience) items. Here is how it works: we get your holder at the port, take it to one of our distribution centres, return the unfilled compartment to the port rapidly, and afterward briefly store and set up your item for on-time conveyance to QVC.

#3. You have blended cargo on a trailer

If a trailer could be stacked in an inappropriate manner where the principal cargo that needs to fall off is sitting behind another different cargo. For this situation, the driver can empty the beds that are not yet required at a cross-dock office, convey the cargo that should be obtained first, and afterward return to the office to get the leftover cargos.

#4. Your truck is overweight

If your vehicle is heavy or over-hub weight, a cross-dock service supplier can move your heap or dump things to keep you agreeable.

#5. You have loads rolling in from different sellers

If you have items showing up from various sellers in better places, you can have them transported to a cross docking supplier that can consolidate shipments into one conveyance for a retail client.

#6. You are utilising multi-purpose transport

Many cross-dock offices are outfitted with rail siding that permits cars to dump straight into the structure for capacity and stacking onto a truck. Notwithstanding rail siding, a few suppliers like Kanban have a yard that can get focus bar railcars.

#7. You are delivering temperature-delicate things

Numerous suppliers of cross docking services have both environment-controlled warehousing space (counting temperature-controlled docks) and reefer trailers to keep your temperature-delicate items inside spec at all times.

Pros of cross docking services #1. High Product Turnover Rates

Using cross docking services can improve your item turnover rates, as the merchandise is moved rapidly through a cross-dock terminal with negligible to no capacity time. Accordingly, you can reduce your stock rack time, which can expand your business' productivity.

2. Decreased Storage and Labor Costs

Capacity-related costs are decreased through cross docking services, as the need to store items for extended periods is limited. This decrease of the expenses would then be able to mean expense reserve

funds for your business. Besides, since products are not, at this point, needed to be picked and taken care of, this helps limit material dealing with, bringing about decreased work-related costs.

#3. Limited Product-Related Risks

In cross-dock distribution centres, different dangers implied with the treatment of merchandise are limited. Since items are not, at this point, rearranged all through capacity territories, material taking care of is altogether diminished. Therefore, item harm, loss of stock, and potential human mistakes are kept away from.

#4. Expanded Customer Satisfaction

As cross docking services enforce the elimination of the requirement for merchandise capacity, they can be transported to the clients professionally and facilitated. This can somehow affect your client care as conveyance lead times are shortened, and the items are followed through on schedule.

Cons of cross docking services

#1. Requires Sufficient Transport Carriers

A cross docking officer depends intensely on its vehicle transporters since products are delivered quickly and not put away. Accordingly, there is a requirement for an adequate number of

transportation transporters to guarantee the cross-dock framework's smooth and effective working.

#2. Need for Reliable Suppliers

Solid providers are fundamental to work with cross docking tasks successfully. This is because cross docking requires precise and on-time conveyances from providers to guarantee merchandise can be conveniently delivered to clients.

#3. Needs In-Depth Planning and Coordination

Cross docking service needs top to bottom arranging and provider coordination, as it includes different contemplations, for example, supply-request examination, shipment timetables, and then some.

Without appropriate arranging and execution, there is a high likelihood that the cross-dock framework's effectiveness and dependability can be contrary affected.

Some final thought about cross docking services

Cross docking services can help you transport merchandise quicker, diminish warehousing costs, and limit item-related dangers. Notwithstanding, it is vital to mull over the compromises related to this help. Assuming you can successfully deal with its disadvantages, cross docking may be the answer for supporting the productivity of your business.

On the other hand, the cross docking facility could replace the traditional facility which cost money and land to operate. In this case, the cross docking facility could be much cheaper and more convenient for the logistic activities.

1.12 Unit End Questions

A. Descriptive Questions Short Questions

1. Name the four principal areas of marketing that logistics interacts with
2. What are the objectives of logistics management?
3. What is cross docking in transportation?
4. What are the function of logistics management?
5. What is containerization in transportation management?

Long Questions

1. Raw teakwood is to be exported from Malaysia to India in bulk. Which mode of transport would you recommend? What are the advantages and disadvantages of such?

a mode.

2. "Materials management plays important role in optimization of overall profitability of any firm". Elaborate.
3. Describe the four modes of transportation, identifying the most significant characteristics of each. What is the basic concept behind Inter-modal movement?
4. Elaborate the significance of Logistics for a developing country like India
5. What are the modern logistics infrastructure that could act as a boon for organizations?

B. Multiple Choice Questions

1..... production control and physical distribution are the three major operations of logistics.

a. Supply chain Management

b. Materials Management
c. Logistics Management
d. Personal Management

2. Which of the following is not an area to responsibilities for a logistics manager?
a. Inventory
b. Marketing
c. warehousing
d. purchasing

3.....includes design and administration of systems to control the flow of materials, WIP and finished inventory to support business unit strategy
a. Logistics management
b. Materials management
c. Bills of material
d. Distribution management

4. Buying according to the requirements is called _____
a. Seasonal Buying
b. Hand to mouth buying
c. Scheduled Buying
d. Tender Buying

5. ..... is the task of buying goods of right quality, in the right quantities, at the right time and at the
right price
a. Supplying
b. Purchasing
c. Scrutinizing
d. None of the above

Answer:
1.b, 2.b, 3.a, 4.b, 5.b

1.13 References

- Bowersox, D. J., Closs, D. J., Cooper, M. B., & Bowersox, J. C. (2013). Supply Chain Logistics Management (4th ed.). New York, NY: McGraw-Hill.
- Brealey, R. A., Myers, S. C., & Allen, F. (2017). Principles of Corporate Finance (12th ed.). New York, NY: McGraw-Hill
- Chea, A. (2011). Activity-Based Costing System in the Service Sector: A Strategic Approach for Enhancing Managerial Decision Making and Competitiveness. International Journal of Business and Management, 6(11), 3–10.
- Cooper, R., & Kaplan, R. S. (1988). Measure Costs Right: Make the Right Decisions. Harvard Business Review, 66(5), 96–103.
- Coyle, J. C., Langley, C. J. Jr., Novack, R. A., & Gibson, B. J. (2017). Supply Chain Management: A Logistics Perspective (10th ed.). Boston, MA.

Certificate/Diploma Course in
Retail and Sales Management
DRS6–Logistics and Supply Chain Management

UNIT- 2 SUPPLY CHAIN

STRUCTURE

2.0. Objectives
2.1 Introduction
2.2. Concept of Supply Chain Management
2.3. Objectives of Supply Chain Management
2.4. Stages of Supply Chain Management
2.5. Value Chain Process
2.6. Cycle View of Supply Chain Process
2.7. Key Issues in Supply Chain Management
2.8. Logistics and Supply Chain Management
2.9. Supply Chain Drivers and Obstacles
2.10. Supply Chain Strategies
2.11. Strategic Fit
2.12. Best Practices in Supply Chain Management
2.13. Obstacles of Streamlined Supply Chain Management
2.14 Questions for Practice
2.15. References

2.0 Objectives

After completing this Students will be able to

- Define Supply chain management
- Understand difference between evolution of logistics management and SCM
- Explain objectives and concept of SCM
- Explain the obstacles of streamlined SCM

2.1 Introduction

Supply chain refers to the network of interconnected activities, processes, organizations, people, resources, and technologies involved in the creation, production, distribution, and delivery of goods and services to customers. It encompasses the entire journey of a product, from its origin as raw materials to its final consumption by end-users. The goal of supply chain management is to ensure the efficient flow of products, information, and resources while minimizing costs and meeting customer demands.

A supply chain typically involves several key stages:

1. Planning and Design: This stage involves strategic decisions about sourcing, production, distribution, and inventory management. Organizations determine how to design their supply

chain to optimize efficiency and responsiveness.

2. Sourcing: Sourcing involves selecting suppliers and negotiating contracts for the procurement of raw materials, components, or finished products. This stage focuses on building strong relationships with suppliers to ensure a reliable flow of materials.
3. Manufacturing or Production: Once materials are sourced, the manufacturing or production process transforms them into finished goods. This stage includes managing production schedules, quality control, and optimizing manufacturing processes.
4. Distribution and Logistics: Distribution involves transporting products from manufacturers to distributors, retailers, or directly to consumers. Logistics encompasses transportation, warehousing, inventory management, and order fulfillment.
5. Retail and Sales: Retailers sell products to consumers through various channels, including brick-and- mortar stores, online platforms, and other distribution methods.
6. Consumption: The final stage involves consumers purchasing and using the products. Customer feedback and demand patterns influence future supply chain decisions.

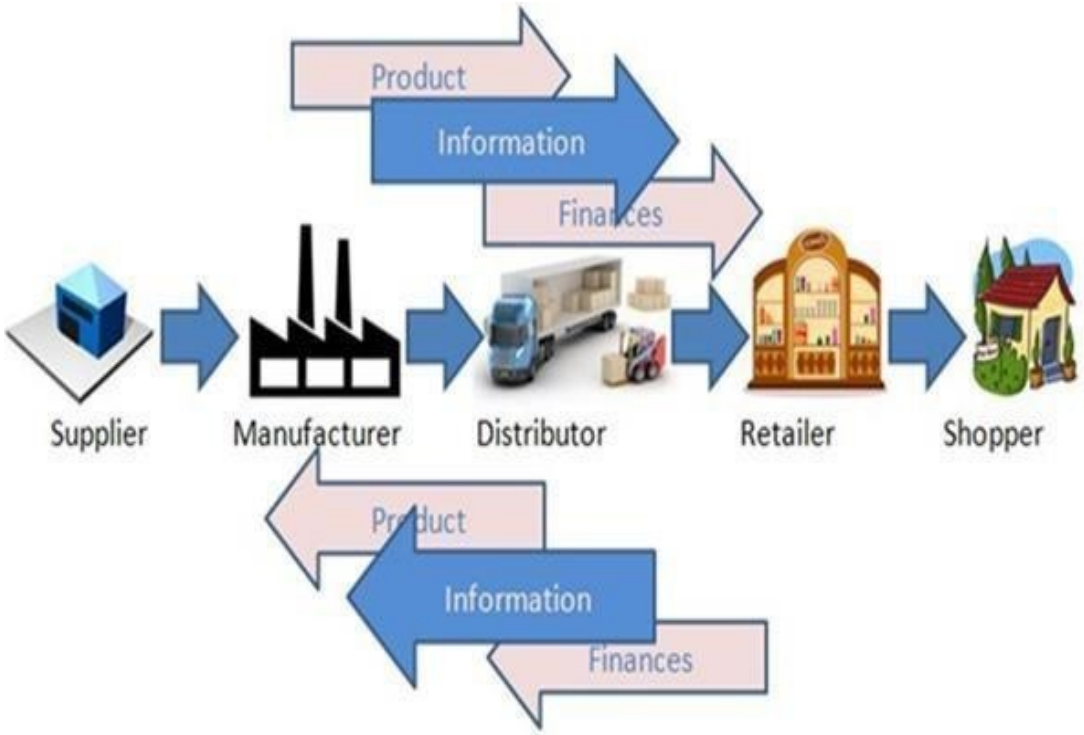
Efficient supply chain management aims to achieve several important objectives:
Cost Reduction: Optimizing processes and minimizing waste help reduce operational costs throughout the supply chain.
Improved Customer Satisfaction: Meeting customer demands and expectations through accurate and timely deliveries enhances customer satisfaction.
-Enhanced Flexibility: A well-managed supply chain can quickly adapt to changes in demand, market trends, and disruptions.
Increased Efficiency: Streamlining operations and reducing inefficiencies lead to faster production and delivery cycles.
Risk Management: Identifying and mitigating risks such as supply disruptions, market shifts, and regulatory changes is vital for maintaining stability.
Collaboration: Successful supply chains require collaboration among various stakeholders, including suppliers, manufacturers, distributors, and retailers.
Innovation: Adopting new technologies and practices can lead to innovative ways of managing supply chains more effectively.
In a globalized business environment, supply chains can span across different countries and continents, involving various cultures, languages, and regulations. As a result, effective supply chain management requires strategic planning, coordination, data-driven decision-making, and a holistic approach that considers the entire end-to-end process.

2.2. Concept of Supply Chain Management

Supply Chain Management can be defined as the management of flow of products and services, which begins from the origin of products and ends at the product's consumption. It also comprises movement and storage of raw materials that are involved in work in progress, inventory and fully furnished goods.
The main objective of supply chain management is to monitor and relate production,

distribution, and shipment of products and services. This can be done by companies with a very good and tight hold over internal inventories, production, distribution, internal productions and sales.

Fig: 2.1 Concept of Management



In the above figure, we can see the flow of goods, services and information from the producer to the consumer. The picture depicts the movement of a product from the producer to the manufacturer, who forwards it to the distributor for shipment. The distributor in turn ships it to the wholesaler or retailer, who further distributes the products to various shops from where the customers can easily get the product.

Supply chain management basically merges the supply and demand management. It uses different strategies and approaches to view the entire chain and work efficiently at each and every step involved in the chain. Every unit that participates in the process must aim to minimise the costs and help the companies to improve their long term performance, while also creating value for its stakeholders and customers. This process can also minimise the rates by eradicating the unnecessary expenses, movements and handling.

Here we need to note that supply chain management and supply chain event management are two different topics to consider. The Supply Chain Event Management considers the factors that may interrupt the flow of an effective supply chain; possible scenarios are considered and accordingly, solutions are devised for them



Fig: 2.2 Supply Chain Management

Advantages of Supply Chain Management

1. Better collaboration with suppliers
2. Better quality control
3. Shipping optimisation
4. Reduced inventory and overhead costs
5. Improved risk mitigation
6. Stronger cash flow
7. A more agile business
8. Better visibility and data analytics

1. Better collaboration with suppliers

Suppliers that understand the business's cost constraints and objectives can be particularly important for businesses with tight margins. Wing It Cosmetics' Gahir says that manufacturers selling to retail outlets that expect a 40-50% markup on the factory gate price can face a profits squeeze if raw material prices are too high. She recommends when negotiating with suppliers, retail-facing businesses should aim for a "golden ratio" of no more than 25% for raw material prices as a percentage of retail sales.

But cost is not the only consideration. Flexibility matters too. In volatile market conditions, Eccles of Employment4Students found that long-standing suppliers were often more willing to accommodate temporary cash flow difficulties. While it's tempting to shop around for cheaper alternatives, Eccles warns against it. "Be cautious about switching purely on cost and remember that long-term relationships are valuable," he says.

And, when it comes to paying suppliers overseas, wherever they might be based, you can manage currency fluctuations and make settling invoices safe and simple with American Express

FX International Payments, which offers same-day exchange rates on eligible transactions in over 80 countries, regardless of whether you have an American Express® Card or not.

2. Better quality control

When you and your suppliers are working to the same standards, quality control problems can be detected earlier. Gahir gives an example: “One of my packaging suppliers contacted me to say that a

batch of packaging that had just arrived wasn’t up to the required standard and she planned to send it back, which would add three days to the delivery schedule.” However, for Gahir, this delay was a better outcome than having to deal with a defective batch of packaging herself. Emphasising the benefits of trust in supplier relationships, Gahir says: “That conversation was only able to happen because we're on the same page.”

3. Shipping optimisation

Logistics costs are set to rise significantly, potentially impacting small businesses across the UK. Reducing the number of separate distribution channels and making use of logistics specialists could reduce your distribution costs relative to your competitors, helping you to maintain stronger cash flow and profits. “Having too many suppliers with independent shipping and delivery streams has been the biggest source of inefficiency,” says Gahir. “We’ve responded to this by looking at storage and shipping aggregators.”

4. Reduced inventory and overhead costs

An efficient supply chain can reduce the need to maintain inventory, therefore cutting overhead costs associated with storage and security. However, a very lean inventory increases pressure on distribution networks and reduces resilience to supply chain shocks. So it’s important to identify your optimal inventory level.

5. Improved risk mitigation

In general, the further along a supply chain issue is detected, the more expensive it is to fix. That’s why supply chain management, which offers visibility of the supply chain from end-to-end, is so important. For this reason, around 50% of supply chain leaders own all of the six "links" frequently associated with supply chain management: product development; demand planning; supply planning; sourcing and procurement; manufacturing; and logistics and distribution.

6. Stronger cash flow

Running an efficient supply chain that is based on good supplier relationships, maintains strict quality and stock control, and keeps a watchful eye on costs and prices can greatly benefit a business’s liquidity by improving cash flow.

7. A more agile business

“A good supply chain enables us to adapt to opportunities,” says Eccles. For example,

Employment4Students identified a process inefficiency in a client’s business. Eccles explains: “We realised we had a couple of suppliers whose software could help and managed to get a process in place really quickly, which they adopted and found really helpful. So, if you’ve got good suppliers, they can help you unlock new opportunities.”

As always, however, it pays to be prepared, as supplier capacity can impede business opportunities. Gahir says that it’s worth investing more up-front to ensure that the suppliers you

have in place are able to scale up as your business grows.

8. Better visibility and data analytics

Business managers can keep in constant touch with suppliers using mobile phone apps, conferencing platforms and shared dashboards. Software tools can also help to manage stock levels efficiently, track distribution channels and monitor business performance. Having real-time data metrics at your fingertips will enable you to put in place contingency plans to enable your business to ride out storms and take advantage of opportunities as they arise.

2.3. Stages Of Supply Chain

Supply chain management is a process used by companies to ensure that their supply chain is efficient and cost-effective. A supply chain is the collection of steps that a company takes to transform raw materials into a final product. The five basic components of supply chain management are discussed
below −

Plan

The initial stage of the supply chain process is the planning stage. We need to develop a plan or strategy in order to address how the products and services will satisfy the demands and necessities of the customers. In this stage, the planning should mainly focus on designing a strategy that yields maximum profit.

For managing all the resources required for designing products and providing services, a strategy has to be designed by the companies. Supply chain management mainly focuses on planning and developing a set of metrics.

Develop(Source)

After planning, the next step involves developing or sourcing. In this stage, we mainly concentrate on building a strong relationship with suppliers of the raw materials required for production. This involves not only identifying dependable suppliers but also determining different planning methods for shipping, delivery, and payment of the product.

Companies need to select suppliers to deliver the items and services they require to develop their product. So in this stage, the supply chain managers need to construct a set of pricing, delivery and payment processes with suppliers and also create the metrics for controlling and improving the relationships.

Finally, the supply chain managers can combine all these processes for handling their goods and services inventory. This handling comprises receiving and examining shipments, transferring them to the manufacturing facilities and authorising supplier payments.

Make

The third step in the supply chain management process is the manufacturing or making of products that were demanded by the customer. In this stage, the products are designed, produced, tested, packaged, and synchronised for delivery.

Here, the task of the supply chain manager is to schedule all the activities required for manufacturing, testing, packaging and preparation for delivery. This stage is considered as the most metric-intensive unit of the supply chain, where firms can gauge the quality levels, production output and worker productivity

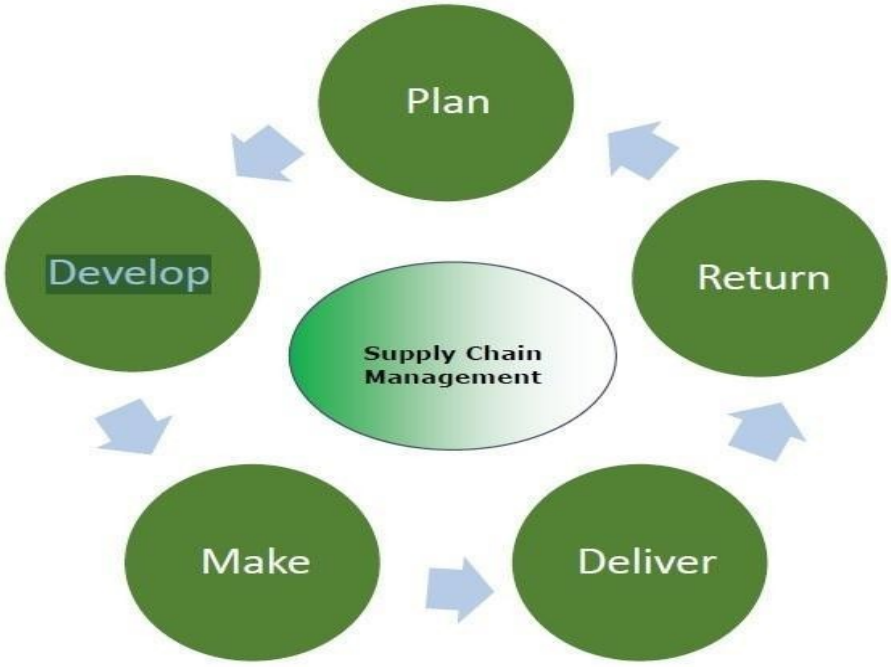


Fig: 2.3 Supply Chain Management

Deliver

The fourth stage is the delivery stage. Here the products are delivered to the customer at the destined location by the supplier. This stage is basically the logistics phase, where customer orders are accepted and delivery of the goods is planned. The delivery stage is often referred as logistics, where firms collaborate for the receipt of orders from customers, establish a network of warehouses, pick carriers to deliver products to customers and set up an invoicing system to receive payments.

Return

The last and final stage of supply chain management is referred as the return. In the stage, defective or damaged goods are returned to the supplier by the customer. Here, the companies need to deal with customer queries and respond to their complaints etc.

This stage often tends to be a problematic section of the supply chain for many companies. The planners of supply chain need to discover a responsive and flexible network for accepting damaged, defective and extra products back from their customers and facilitating the return process for customers who have issues with delivered products.

2.4 Value Chain Process

What Is a Value Chain?

A value chain is a series of consecutive steps that go into the creation of a finished product, from its initial design to its arrival at a customer's door. The chain identifies each step in the process at which value is added, including the sourcing, manufacturing, and marketing stages of its production.

A company conducts a value-chain analysis by evaluating the detailed procedures involved in

each step of its business. The purpose of a value-chain analysis is to increase production efficiency so that a company can deliver maximum value for the least possible cost.

Understanding Value Chains

Because of ever-increasing competition for unbeatable prices, exceptional products, and customer loyalty, companies must continually examine the value they create in order to retain their competitive advantage. A value chain can help a company to discern areas of its business that are inefficient, then implement strategies that will optimise its procedures for maximum efficiency and profitability.

In addition to ensuring that production mechanics are seamless and efficient, it's critical that businesses keep customers feeling confident and secure enough to remain loyal. Value-chain analyses can help with this, too.

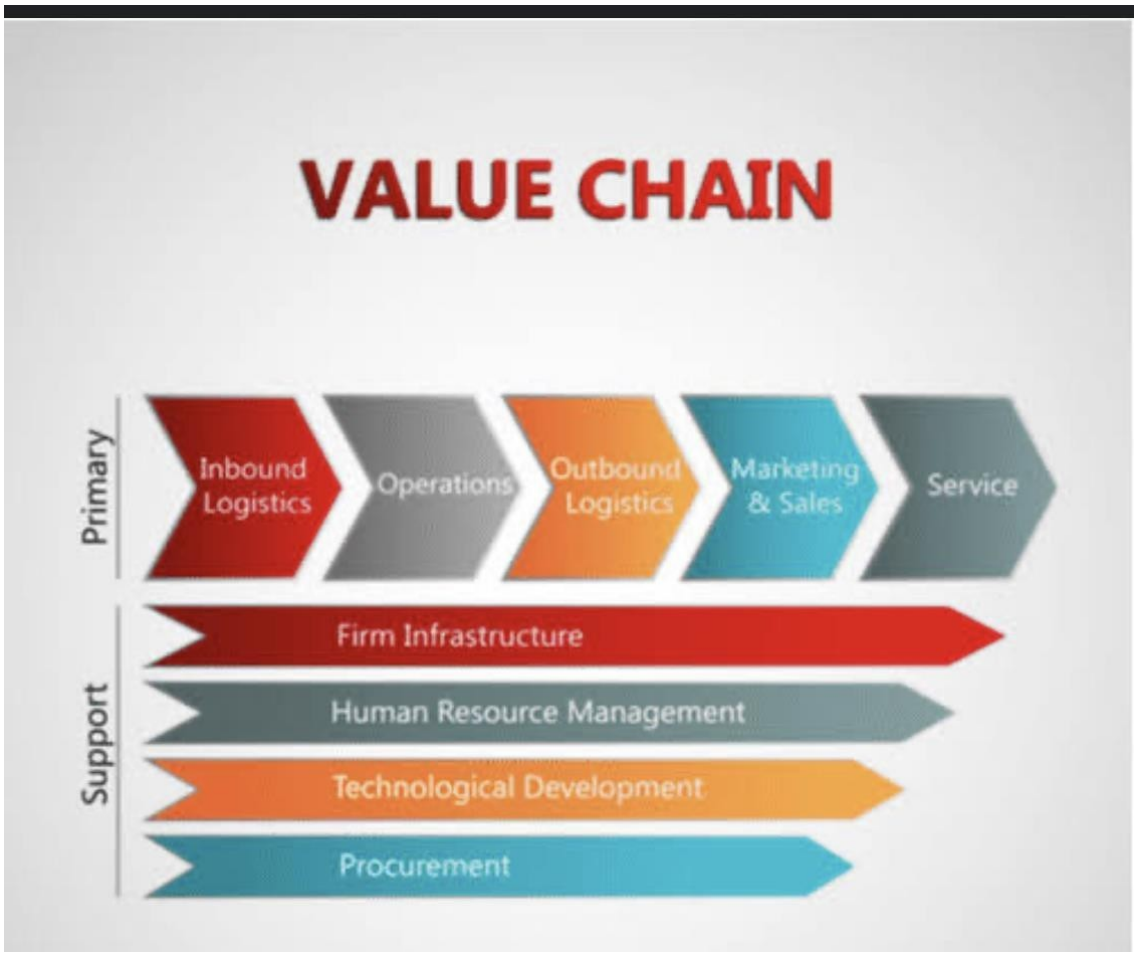


Fig: 2.4 Value Chain

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.1 Specific activity in each category will vary according to the industry.

Primary Activities

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

1. **Inbound logistics** include functions like receiving, warehousing, and managing inventory.
2. **Operations** include procedures for converting raw materials into a finished product.
3. **Outbound logistics** include activities to distribute a final product to a consumer.
4. **Marketing and sales i**nclude strategies to enhance visibility and target appropriate customers— such as advertising, promotion, and pricing.
5. **Service** includes programs to maintain products and enhance the consumer experience—like customer service, maintenance, repair, refund, and exchange.

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:

1. **Procurement** concerns how a company obtains raw materials.
2. **Technological development** is used at a firm's research and development (R&D) stage—like designing and developing manufacturing techniques and automating processes.
3. **Human resources (HR) management** involves hiring and retaining employees who will fulfil the firm's business strategy and help design, market, and sell the product.
4. **Infrastructure** includes company systems and the composition of its management team—such as planning, accounting, finance, and quality control.

Examples of Value Chains Starbucks Corporation

Starbucks (SBUX) offers one of the most popular examples of a company that understands and successfully implements the value-chain concept. There are numerous articles about how Starbucks incorporates the value chain into its business model.

Trader Joe's

Another example is privately held grocery store Trader Joe's, which also has received much press about its tremendous value and competitive edge. Because the company is private, there are many aspects of its strategy that we don't know. However, when you enter a Trader Joe's store, you can readily observe instances of Trader Joe's business that reflect the five primary activities of the value chain.

1. Inbound logistics. Unlike traditional supermarkets, Trader Joe's does all of its receiving, shelving, and inventory-taking during regular store hours. Although potentially maddening for shoppers, this system creates a ton of cost savings in terms of employee wages alone. Moreover, the logistics of having this work take place while customers are still shopping sends the strategic message that "we're all in this together."

2. **Operations**. Here's an example of how a company could apply the value chain creatively. In

primary activity number two above, "converting raw materials into finished product" is cited as an "operations" activity. However, because converting raw materials is not an aspect of the supermarket industry, we can use operations to mean any other regular grocery store function. So, let's substitute "product development," as that operation is critical for Trader Joe's.

The company selects its products carefully, featuring items that you generally can't find elsewhere.

It's private-label products account for more than 80% of its offerings, which often have the highest profit margins, too, as Trader Joe's can source them efficiently in volume.2 Another vital piece of product development for Trader Joe's is its taste-testing and chef-partnership programs, which ensure high quality and continuous product refinement.

3. **Outbound logistics**. Many supermarkets offer home delivery, but Trader Joe's does not. Yet here, we can apply the activity of outbound logistics to mean the range of amenities that shoppers encounter once they are inside a Trader Joe's store. The company has thought carefully about the kind of experience it wants us to have when we visit its stores.

Among Trader Joe's many tactical logistics are its in-store tastings. Usually, there are a few product tastings happening simultaneously, which create a lively atmosphere, and often coincide with the seasons and holidays. The tasting stations feature both new and familiar items that are prepared and served by staff.

4. **Marketing and sales.** Compared to its competitors, Trader Joe's barely does any traditional marketing. However, its entire in-store experience is a form of marketing. The company's copywriters craft product labels to appeal specifically to its customer base. Trader Joe's' unique branding and innovative culture indicate that the company knows its customers well—which it should, as the firm has actually chosen the type of customers it prefers and has not deviated from that model.

Via this indirect marketing of style and image, Trader Joe's has succeeded in differentiating itself in the marketplace, thus sharpening its competitive edge.

5. **Service.** Customer service is paramount for Trader Joe's. Generally, you see twice as many employees as shoppers in their stores. Whatever work they are doing at the moment, the friendly, knowledgeable, and articulate staff are there primarily for *you*. Employees welcome shoppers' interruptions and will instantly rush to find your item or answer your question. In addition, the company has always employed a no-questions-asked refund program. You don't like it, you get your money back—period.

This list could go on and on before ever reaching the four support activities cited above, as Trader Joe's is a wildly successful example of applying value-chain theory to its business.

Key Takeaways

- A value chain is a step-by-step business model for transforming a product or service from idea to reality.
- Value chains help increase a business's efficiency so the business can deliver the most value for the least possible cost.
- The end goal of a value chain is to create a competitive advantage for a company by increasing productivity while keeping costs reasonable.
- The value-chain theory analyses a firm's five primary activities and four support activities.

2.5 Cycle View of Supply Chain Process

A supply chain is a sequence of processes and flows that take place within and between different stages and combine to fill a customer need for a product. Two ways to view the processes performed in a supply chain

- Cycles view and
- Push/pull view

Cycle view

It defines the processes involved and the owners of each process. Process in a supply chain is divided into a series of cycles. Cycles are performed at the interface between two successive stages of a supply chain

Supply chain process can be broken down into four process cycles such as

- Customer order cycle
- Replenishment cycle
- Manufacturing cycle
- Procurement cycle

Each cycles occurs at the interface between two successive stages of the supply chain. A cycle view of the supply chain is very useful when considering operational decisions. It clearly specifies the roles and responsibilities of each member of the supply chain. It helps the designer to consider the infrastructure required to support the processes.

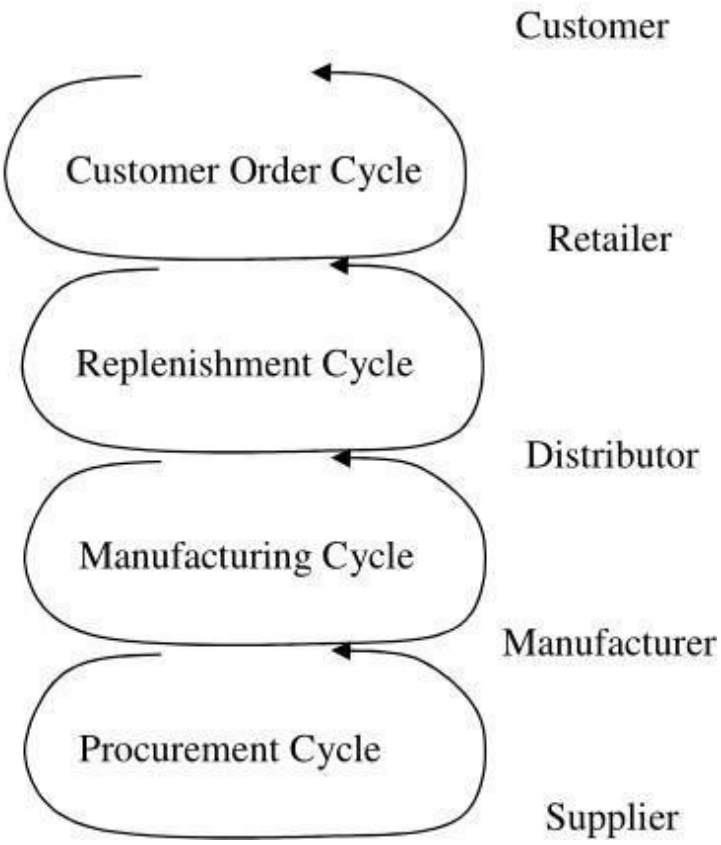


Fig: 2.5 Supply chain process

Push/Pull View

Categories processes in a supply chain based on whether they are initiated in response toa customer order (pull) or in anticipation of a customer order (push). Categorisation is based on the timing of process execution relative to end customer demand.

At the time of execution of a pull process customer demand is known with certainty. In case of push process at the time of execution of a process demand is not known and must be forecasted.

Hence,

- Pull process – reactive process
- Push process – speculative process

Push/pull boundary in a supply chain separates push process from pull process. Very useful when considering strategic decisions relating to supply chain. Forces more global consideration of supply chain processes as they relate to a customer order. More the pull process better the supply chain.

2.6 Key Issues in Supply Chain Management

Key Issue #1: Globalization

Globalization presents several critical supply chain management challenges to enterprises and organizations:

First, to reduce costs across the supply chain, enterprises are moving manufacturing operations to countries which offer lower labor costs, lower taxes, and/or lower costs of transport for raw materials. For some companies, outsourcing production involves not only a single country, but several countries for different parts of their products.

However, outsourcing not only extends the production process globally, but also the company's procurement network. Having suppliers in different geographic locations complicates the supply chain. Companies will have to deal with, coordinate, and collaborate with parties across borders regarding manufacturing, storage, and logistics. Furthermore, they have to extend or maintain fast delivery lead times to customers who want to receive their products on schedule despite the increased complexity in the manufacturer's supply chains. Finally, they also have to maintain real-time visibility into their production cycle — from raw materials to finished goods — to ensure the efficiency of their manufacturing processes.

Second, as companies expand sales into global markets, localisation of existing products requires a significant change in the supply chain as companies adapt their products to different cultures and preferences. There is an inherent risk of losing control, visibility, and proper management over inventory, especially if enterprise applications are not integrated. This requires managing diverse structures of data across geographies effectively.

For example: many manufacturers in Asia still handle trading partner communications via fax and email while suppliers in North America and Europe have utilised EDI for decades. As technology matures, suppliers in emerging markets may skip EDI altogether and move to a more modern API driven approach to communication just as developing countries have skipped land lines in favour cell phones.

Supply chain practitioners need to ask if their enterprise technology is prepared to handle these diverse forms of communication that arise from Globalization, and build a business case to stay prepared.

Key Issue #2: Fast-changing Markets

According to EduCBA, consumer behavior is affected by cultural, social, personal, and psychological factors that are quickly being changed by technology and globalization. Social media is creating new pressures for consumers to conform while putting pressure on enterprises to utilise these sources of information to respond to changing preferences in order to stay interesting and relevant.

Like globalization, the fast-changing consumer market also brings with it supply chain management challenges:

First, products have shorter life cycles due to rapidly changing market demands. Enterprises are under pressure to keep up with the latest trends and innovate by introducing new products, while keeping their total manufacturing costs low because they understand that trends will not last for a long time. This also demands a flexible supply chain that can be utilised for manufacturing other products and for future projects.

Second, aside from new products, companies also need to constantly update product features. Enhancing product features requires enterprises to redesign their supply chain to accommodate product changes.

Finally, innovation presents a challenge in forecasting demand for new products. The constant innovation necessitated by fast-changing markets also means enterprises will constantly have to anticipate demand for new products. Enterprises need to create and maintain an agile supply chain that can respond well to spikes and dips in demand and production needs.

Companies should be asking if they have all the data needed to make planning decisions to address challenges created by fast-changing markets. For example, if stated lead times from suppliers are longer than actual times, this will lead to higher inventory levels than are actually required and affect costly decisions around network planning and optimization. Omnichannel retail has reated silos of sales data that have to be blended and harmonised to detect demand signals earlier in the planning process as well.

Key Issue #3: Quality and Compliance

Aside from influencing consumer behavior, social media highlights the importance of having high-quality products. According to research conducted by eMarketer, reading reviews, comments, and feedback is the top social media activity that influences online shopping behavior. Furthermore, social media has not only raised consumers' expectations of product quality, but has also amplified the damages caused by product recalls. Thus, enterprises are under increasing pressure to create high-quality products and to create them consistently. They can do so by addressing quality at every level of the supply chain, such as raw materials procurement, manufacturing, packaging, logistics, and product handling.

Product quality often goes hand-in-hand with compliance. Enterprises need to ensure that they meet local and international regulatory standards in manufacturing, packaging, handling, and shipping of their products. Aside from passing quality control and safety tests, enterprises are also required to prepare compliance documents such as permits, licenses, and certification which can overwhelm them and their supply chain management systems.

Emerging capabilities like IoT, Smart Packaging, and Blockchain are changing how compliance is enforced and measured. However, these innovations will produce streams of data that can't be handled with the enterprise technology of the past 20 years. Managers should carefully consider

where these investments make sense and asking IT if the business is utilising platforms based on micro-services and big data to support these heavy data lifting requirements.

2.7 Logistics and Supply Chain Management

All the activities, associated with the sourcing, procurement, conversion and logistics management, comes under the **supply chain management**. Above all, it encompasses the coordination and collaboration with the parties like suppliers, intermediaries, distributors and customers. **Logistics Management** is a small portion of Supply Chain Management that deals with the management of goods in an efficient way.

Supply Chain Management, it is a broader term which refers to the connection, right from the suppliers to the ultimate consumer.

It has been noticed that there is a drastic change in the manner in which business was conducted many years ago and now. Due to the improvement in the technology, which leads to the development of all key areas of business? Supply Chain Management also evolved as an improvement over Logistics Management, from past years. Check out this article to understand the difference between Logistics Management and Supply Chain Management.

BASIS FOR COMPARISON	LOGISTICS MANAGEMENT	SUPPLY CHAIN MANAGEMENT
Meaning	The process of integrating the movement and maintenance of goods in and out the organization is Logistics.	The coordination and management of the supply chain activities are known as Supply Chain Management.
Objective	Customer Satisfaction	Competitive Advantage
Evolution	The concept of Logistics has been evolved earlier.	Supply Chain Management is a modern concept.
How many organizations are involved?	Single	Multiple
One in another	Logistics Management is a fraction of Supply Chain Management.	Supply Chain Management is the new version of Logistics Management.

Table: 2.1 difference between Logistics Management and Supply Chain Management.

Definition of Logistics Management

The management process which integrates the movement of goods, services, information, and capital, right from the sourcing of raw material, till it reaches its end consumer is known as Logistics Management. The objective behind this process is to provide the right product with the

right quality at the right time in the right place at the right price to the ultimate customer. The logistic activities are divided into two broad categories they are:

- **Inbound Logistics**: The activities which are concerned with procurement of material, handling, storage and transportation
- **Outbound Logistics**: The activities which are concerned with the collection, maintenance, and distribution or delivery to the final consumer.

Apart from these, other activities are warehousing, protective packing, order fulfilment, stock control, maintaining equilibrium between demand and supply, stock management. This will result in savings in cost and time, high-quality products, etc.

Definition of Supply Chain Management

Supply Chain Management (SCM) is a series of interconnected activities related to the transformation and movement of raw material to the finished goods till it reaches to the end user. It is the outcome of the efforts of multiple organizations that helped in making this chain of activities successful.

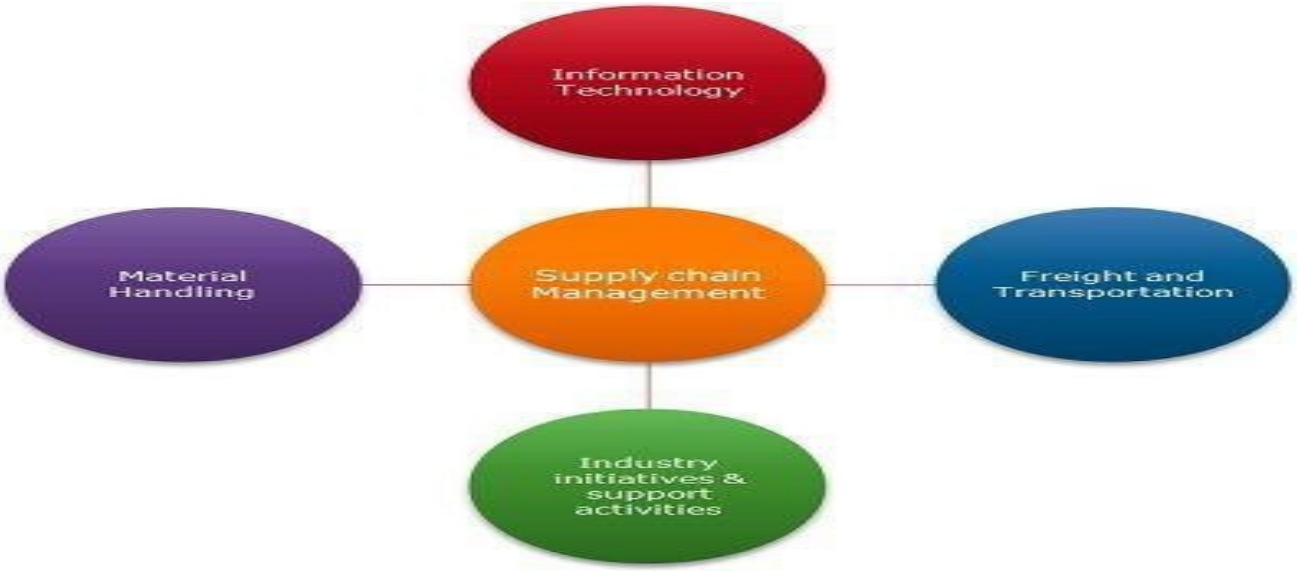


Fig: 2.6 Supply Chain Management

These organizations may include the firms with whom the organization is currently working like partners or suppliers, manufacturers, wholesalers, retailers, and consumers. The activities may include integration, sourcing, procurement, production, testing, logistics, customer services, performance measurement, etc.

Supply Chain Management has a multi-dimensional approach which manages the flow of raw materials and works in progress (semi-finished goods) within the organization and the end product outside the organization till it reaches the hands of the final consumer with a complete emphasis on the customer requirement.

Key Differences Between Logistics and Supply Chain Management

The following are the major differences between logistics and supply chain management:

1. The flow and storage of goods inside and outside the firm are known as

Logistics. The movement and integration of supply chain activities are known as Supply Chain Management.

2. The main aim of Logistics is full customer satisfaction. Conversely, the main aim behind Supply Chain Management is to gain a substantial competitive advantage.
3. There is only one organisation involved in Logistics while some organisations are involved in Supply Chain Management.
4. Supply Chain Management is a new concept as compared to Logistics.
5. Logistics is only an activity of Supply Chain Management.

Conclusion

Logistics is a very old term, firstly used in the military, for the maintenance, storage and transportation of army persons and goods. Nowadays, this term is used in many spheres, not specifically in the military after the evolution of the concept of Supply Chain Management. It has also been said that SCM is an addition over Logistics Management as well as SCM comprises of logistics. Both are inseparable. Hence they do not contradict but supplement each other. SCM helps Logistics to be in touch with the transportation, storage and distribution team.

2.8 Supply Chain Drivers And Obstacles

Supply chain capabilities are guided by the decisions you make regarding the five supply chain drivers. Each of these drivers can be developed and managed to emphasise responsiveness or efficiency depending on changing business requirements.

The five drivers provide a useful framework for thinking about supply chain capabilities. Decisions made about how each driver operates will determine the blend of responsiveness and efficiency a supply chain is capable of achieving. The five drivers are illustrated in the diagram below:

1. PRODUCTION

This driver can be made very responsive by building factories that have a lot of excess capacity and use flexible manufacturing techniques to produce a wide range of items. To be even more responsive, a company could do their production in many smaller plants that are close to major groups of customers so delivery times would be shorter. If efficiency is desirable, then a company can build factories with very little excess capacity and have those factories optimised for producing a limited range of

items. Further efficiency can also be gained by centralizing production in large central plants to get better economies of scale, even though delivery times might be longer.

2. INVENTORY

Responsiveness can be had by stocking high levels of inventory for a wide range of products. Additional responsiveness can be gained by stocking products at many locations so as to have the inventory close to customers and available to them immediately. Efficiency in inventory management would call for reducing inventory levels of all items and especially of items that do not sell as frequently. Also, economies of scale and cost savings can be gotten by stocking inventory in only a few central locations such as regional distribution centres (DCs).

3. LOCATION

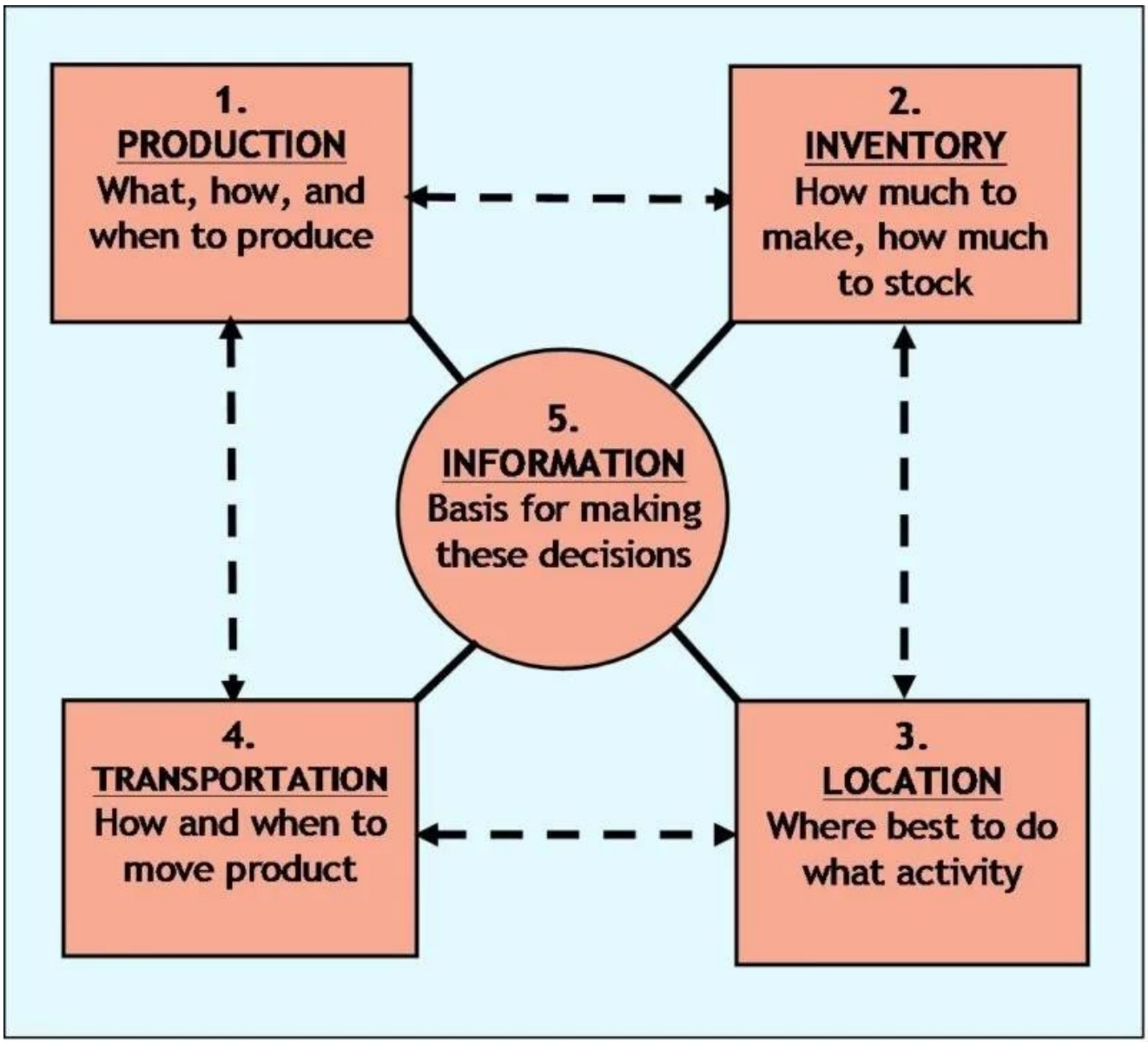


Fig: 2.7 INVENTORY

A location decision that emphasises responsiveness would be one where a company establishes many locations that are close to its customer base. For example, fast-food chains use location to be very responsive to their customers by opening up lots of stores in high volume markets. Efficiency can be achieved by operating from only a few locations and centralising activities in common locations. An example of this is the way e-commerce retailers serve large geographical markets from only a few central locations that perform a wide range of activities.

4. TRANSPORTATION

Responsiveness can be achieved by a transportation mode that is fast and flexible such as trucks

and airplanes. Many companies that sell products through catalogs or on the Internet are able to provide high levels of responsiveness by using transportation to deliver their products often within 48 hours or less. FedEx and UPS are two companies that can provide very responsive transportation services. And now Amazon is expanding and operating its own transportation services in high volume markets to be more responsive to customer desires. Efficiency can be emphasized by transporting products in larger batches and doing it less often. The use of transportation modes such as ship, railroad, and pipelines can be very efficient. Transportation can also be made more efficient if it is originated out of a central hub facility or distribution centre (DC) instead of from many separate branch locations.

5. INFORMATION

The power of this driver grows stronger every year as the technology for collecting and sharing information becomes more wide spread, easier to use, and less expensive. Information, much like money, is a very useful commodity because it can be applied directly to enhance the performance of the other four supply chain drivers. High levels of responsiveness can be achieved when companies collect and share accurate and timely data generated by the operations of the other four drivers. An example of this is the supply chains that serve the electronics market; they are some of the most responsive in the world. Companies in these supply chains, the manufacturers, distributors, and the big retailers all collect and share data about customer demand, production schedules, and inventory levels. This enables companies in these supply chains to respond quickly to situations and new market demands in the high- change and unpredictable world of electronic devices (smartphones, sensors, home entertainment and video game equipment, etc.).

Obstacles to Achieving Strategic Fit

Increasing Variety of Products: In the era of mass customisation production variety is increasing.

The customers becoming increasingly demanding. Today's customers are demanding faster fulfilment, better quality, and better performing products for the same price that they are paying today.

The supply chain is getting fragmented. At one-time vertical integration was the order of the day. But the present trend is to concentrate on core competence and outsource more activities. Thus the supply chain is more fragmented now.

Globalization is creating global supply chains and hence physical distance is increasing between a company and its suppliers and a company and its customers.

While creating a strategy is difficult, executing it is much more difficult. Many companies understand Toyota Production System now, but still find it difficult to implement and operate.

2.9 Supply Chain Strategies

One of the most challenging aspects of your business is managing your supply chain successfully. However, it is one of the most necessary ones. Your ability to manage your supply chain can mean the difference between rapid growth and sudden decline for your company.

For a long time, supply chain management focused solely on getting goods from one place to another. In today's ever-increasingly competitive market, companies must deconstruct their supply chains.

Delivering a shipment is still essential, but doing so in a high-quality manner lowers the

associated costs. As a crucial part of any supply chain, transportation spending management can significantly impact your growth.

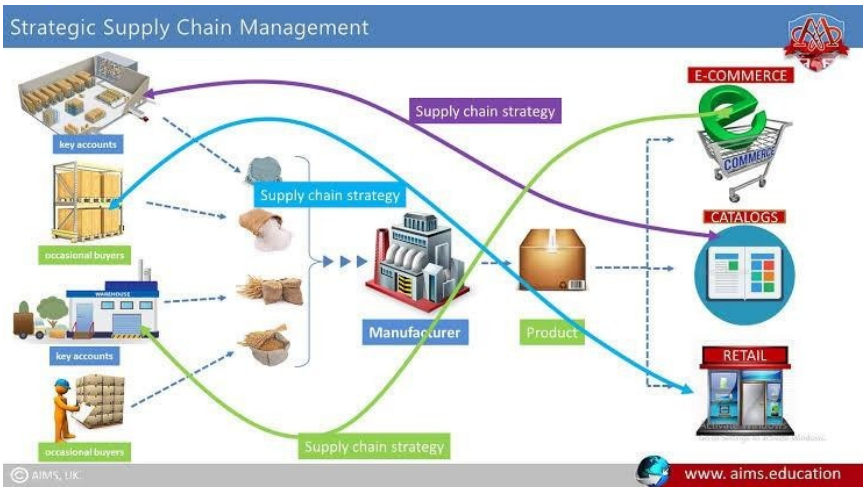


Fig: 2.8 Strategic Supply Chain management

Consider the following proven strategies for the successful supply chain management.

1. Set up a supply chain council

The supply chain set up by you must meet your company's objectives, strategies, mission, and vision. That is a critical consideration. When corporate and supply chain management have divergent ideas, it can squander money, time, and effort. This can be solved simply by creating the Supply Chain Council as mentioned. A supply chain council looks at your business's overall needs and operations to structure your supply chain. When a company's counsel is diverse, it can consider the needs of all departments and functions, allowing it to make well-informed decisions that benefit the whole organization. The supply chain chief, corporate executives, department directors, business unit heads, and influential company leaders often make up such a council, which is why it is so common. When a company fails to understand how crucial advanced supply chain management is, it can have a negative impact on the supply chain's flexibility and overall performance. Higher management benefits from having a clearer picture of the effects of the efficient supply chain thanks to a strategic council. Using advanced cost
analysis, a council can help a company's bottom line grow. As a result, the company can make data- driven decisions rather than ones based on guesswork and intuition. The better the council can see the costs the company or its departments incur, the more advanced the supply chain's tools will be. When companies can directly see the delivery cost, they can better analyse the profit margin and rethink their POS, as in the example above.

1. Leverage technology

Nowadays, it's a standard practice-incorporating rather than a particular case. It's essential to pick a platform that's right for your requirements. Reorganising your supply chain to accommodate the platform may be detrimental to your business's long-term health. To streamline processes, increase visibility, reduce paperwork, and automate specific tasks, platforms like ERPs and SAPs are excellent tools. For your supply chain's big picture, transportation spend and transportation management systems are ideal tools—they help boost productivity while also lowering risk. They also provide data-driven insights into business decisions. A solid foundation is essential for streamlining supply chain management while also supporting the overall strategy of your business. Technology that can help a company become

more profitable and transparent revolves around better data management and costs. It isn't uncommon for businesses to use a variety of transportation spend management platforms, including data management, rate management, and cost allocation.

2. Create alliances

Having collaborative partners is critical when managing a supply chain. A strong foundation of communication, increased transparency, common goals, and mutual collaboration is the key to building a healthy relationship. Without these partnerships, your supply chain management could turn into a losing uphill battle that suffers in efficiency and profitability. This may even harm your own customers' experience with your brand (through late or damaged deliveries) to help a relationship grow more robust, establish a series of measurable goals for continuous improvement and a detailed strategy for resolving conflicts. The use of tools like carrier scorecards can help your company's transportation spending mature by keeping track of performance, highlighting problems, and communicating them.

1. Aim for overall cost of ownership

Forward-thinking companies are shifting their focus from purchase costs to the total cost of ownership (TCO). It is sensible for businesses to focus on TCO rather than acquisition costs, which typically account for about half of total costs. Using TCO, companies can see costs and profit margins in minute detail, allowing for more precise planning. A supply chain council should include as many managers and department heads to ensure data is as accurate as possible. Purchasers and sellers can work together to reduce TCO after internal input has been taken into account.

2. Strategically source suppliers

If you want to focus on TCO rather than the bottom line, you'll need to find vendors with the same

attitude. Price isn't the only consideration; many others can lower or raise costs dramatically. Low-cost providers with poor quality, on the other hand, may result in refunds (lost money) or lost sales, costing you much money in the long run. It is necessary to consider all of the costs involved, including operations, training, maintenance, and warehousing (especially if the goods require special warehousing). Making a dynamic procurement department that can source a strong partner with the right mind-set can help offset some costs. As a result, the process as a whole is more profitable in the long run.

3. Centralised contract management

In contract management, centralising contracts along the supply chain can be highly beneficial. It's easy to overlook important details or, worse, lose entire contracts when contracts are dispersed among several departments, such as finance, legal, purchasing, and operations. The supply chain management division should handle all arrangements to ensure better compliance, standardisation of contracts, and a more detailed perspective. Contract-signing, contract maintenance, and contract-revision processes are simplified and made more efficient. Consolidating contracts in the supply chain division also allows leaders to better manage risk by taking advantage of the company's overall service expenditure, resulting in more significant savings and lower costs.

4. Optimised inventory management

Supply chain cost management often overlooks inventory management, despite its importance.

Because warehousing practices vary widely, it's difficult for businesses to determine the most cost- effective approach. Keeping inventory can cost as much as 40% of the original purchase price. As a
result, competitive firms look for ways to reduce TCO while increasing profit margins by better managing inventory strategies.

5. Regular assessment

To keep a high standard, you must constantly monitor and evaluate your supply chain. On top of helping you improve your supply chain management, regular reviews and consistent data collection and analysis provide the visibility you need to reduce future risk.

6. Monitor and set risk levels

Identifying risk factors along the supply chain can help your processes become more adaptable and ready to deal with any problems that may arise. As many external factors as possible impact risk, the sourcing decision process is one of the most important places to look for it.

To reduce sourcing risk:

1. Adopt methodologies that assist in identifying risks throughout the entire sourcing process and identify those risks.
2. Analyse the likelihood and consequences of a risk occurring.
3. Analyse the financial and operational costs that would be incurred if a risk materialised.
4. Risks should be graded or evaluated to determine their importance and how often they should be examined.

2.10 Strategic Fit

Strategic Fit may be defined as matching resources and capabilities but in Procurement it means requiring that both the competitive and supply chain strategies of a company have aligned goals. To provide the highest level of service as a procurement organization, strategic fit must be achieved.

Step 1 | Understanding Customer Requirements & Uncertainties

Procurement leaders are commonly tasked to understand the larger business and customer needs prior to executing a purchase. This discovery process should involve gaining a comprehensive understanding of the customer's project scope, goals and budget. In addition to covering the basic information Procurement requires, the customer will likely also have their own set of requirements and uncertainties. When identifying Customer Requirements & Uncertainties, it is important to establish an initial Voice of Customer (VOC) with the customer. An effective way to do this is through scheduling a call or meeting to understand some basic information such as:

Quality

- Reliability
- Availability
- Rework or Scrap

Cost

- Budget or Target Spend
- Target Purchase Price

- Residual Value

Delivery

- Lead Times
- Turnaround Times
- Cycle Times

Service & Safety

- Service Requirements
- After-purchase Reliability
- Customer Required Maintenance

Corporate Responsibility

- Diverse Business Enterprise
- Ethical Business conduct
- Environmental Sustainability

By connecting with the customer to review a basic list of procurement requirements, not only is Procurement able to establish the Critical Customer Requirements (CCR); they've taken the first step toward further growing relationships with their colleagues and suppliers.

Step 2 | Understanding Procurement Capabilities

Once the VOC has been gathered the next step is to build on the initial discovery in order to generate Critical Customer Requirements (CCR). CCR is commonly practiced across Lean Six Sigma but can be
leveraged to understand and meet the needs of Procurement's customer.

Translating VOC to CCR can be quite simple dependent upon customer compliance and Procurement's ability to capture VOC. When translating Voice of Customer to Critical Customer Requirements it is important to keep the following in mind:

- Important to The Customer ("Customer Cares")
    - Value Proposition
- Specifies Requirements ("Must-Have" or "Must Be")
    - Ultimately Satisfy
    - Potentially Delight
- Can Be Measured
- Establishes A Target
    - Customer Specifications
    - Acceptable Range of Performance

In some cases, translating Voice of Customer to a Critical Customer Requirement can be straightforward, such as Lead Time. In other cases, a customer may still be uncertain as to what they are looking for and
it is Procurement's responsibility to guide them within existing procurement capabilities to achieve their goals.

Step 3 | Procurement Responsiveness

The final step in Achieving Strategic Fit is to match customer requirements to the procurement organisations capabilities. This can may be achieved through utilising the already translated

CCR's to enable an appropriate level of procurement responsiveness. For example, a large consumer product distributor may require more responsive procurement due to product variability, or seasonal demand. Procurement would respond by enabling additional suppliers or working with suppliers to increase existing manufacturing capacity. The below graphic represents the Zone of Strategic Fit and how

Procurement's responsiveness will vary based on customer requirements and uncertainty.

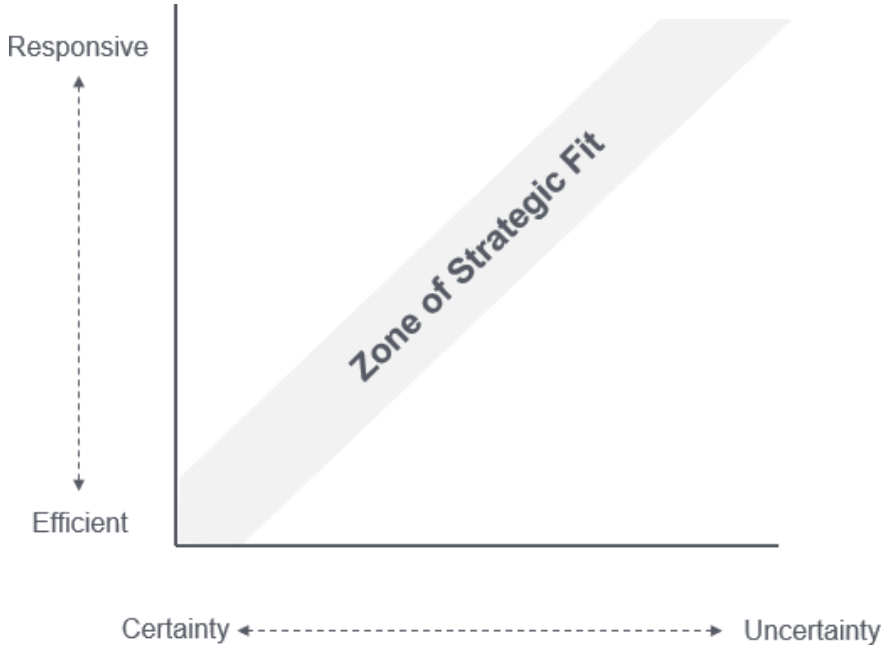


Fig: 2.8 Zone of Strategic Fit

Strategic Fit Achieved

While it can be challenging to initially achieve strategic fit, once achieved, it can become much easier to control the value generated by Procurement. This is because achieving strategic fit is an effort to support both the customer and Procurement in their own goals. For Procurement this often remains as identifying supply demand at the lowest possible cost. Achieving Strategic Fit allows Procurement to align their goals with the greater business needs.

2.11. Best Practices in Supply Chain Management

Successfully managing a supply chain may be the most difficult aspect of your business, yet, it stands as one of the most crucial. Your supply chain management could be the difference between substantial growth or the gradual dwindling of business.

Historically, supply chain management was only concerned with moving items from Point A to Point B. Today, companies must break down their supply chain in an ever-growing competitive market.

Successful supply chain management is no longer bound only to delivering a shipment, but doing so in a qualitative manner while simultaneously lowering the associated costs. Transportation spend management has emerged as a vital aspect of any supply chain that could effectively change the course of your company's growth.

We'll guide you through the most important practices for successful supply chain management that we've identified at Trax.

1. Set up a supply chain council

2. Establish a supply chain structure
3. Leverage technology
4. Create alliances
5. Focus on the total cost of ownership
6. Strategically source suppliers
7. Move contract management to the supply chain
8. Optimise inventory for reduced cost
9. Establish regular reviews
10. Set control and risk levels
11. Mature Your Transportation Company

1. Set up a supply chain council

One of the most important factors to consider with your supply chain is to ensure that your company's objectives, strategies, mission, and vision are met by your supply chain. A disparity between the visions of corporate management and supply chain management can lead to loss of profit, time, and effort across the company. A simple solution is to set up a supply chain council.

A supply chain council helps to structure your supply chain through a macro view of your company's needs and operations. A diverse council can take into consideration the needs of all the departments and functions of a company and make informed decisions that positively affect all aspects of a company. Such a council often consists of key players: the supply chain head, corporate executives, department directors, business unit heads, and influential leaders within the company.

Although supply chain management is one of the most flexible and critical parts of any company operation, a supply chain may suffer from a company's inability to comprehend the importance of advanced supply chain management. A strategic council aids in providing higher management with a better view of the supply chain's effects.

A council helps boost a company's bottom line through advanced cost analysis. This allows the company to make decisions based on data rather than speculations and gut instincts. The more advanced the supply chain's tools, the better view that the council has on the costs the company or their departments incur.

For example, transportation spend management helps companies directly understand the cost of delivery, so sales can better analyse the profit margin and reconsider their POS. The more mature your transportation spend management, the more diverse and valuable insights your supply chain council gains into increasing your bottom line. Take the Trax Transportation Spend Management (TSM) Maturity Model. This is a framework that provides a roadmap for large, global transportation enterprises to go from a lack of visibility and control to a fully optimised transportation supply chain that is based on accurate detailed data.

2. Establish a supply chain structure

In order to optimise processes and streamline a supply chain, a solid foundation must be in place. The success of a supply chain mirrors the integrity of its structure. A company must know what it requires from a supply chain in order to structure it in a way to best meet your company's needs.

Many companies prefer a centralised supply chain management methodology, while others see decentralisation as a method to success. Many dynamic and modern companies, however, have

conceived a hybrid approach—centralised strategy and decision-making and decentralised operations and workloads. This offers a more flexible and adaptive structure.

A hybrid system offers dynamic benefits. First, it allows supply chain management to better collaborate with corporate management and, ultimately, align the supply chain with corporate goals and objectives. Second, decentralising operations utilises the experience and real-time response of workers in the field. This system makes it easier to deal with unexpected problems and/or new developments.

Once a structure is set in place, hiring and recruitment must then take centre stage. Many companies now place purchasing, procurement, planning, contract management, and logistics under the supply chain head. In order to optimise your supply chain structure, it's crucial to instate the right people in your council.

3. Leverage technology

Adopting technology into supply chain processes is no longer considered proactive, but a standard operation. The trick is to choose a platform that meets your needs. Reshaping your supply chain structure to work around the platform can seriously hurt your company.

Platforms, such as ERPs and SAPs, are a great tool to streamline processes, increase visibility, minimize paperwork, and automate certain activities. Transportation management systems and transportation spend management systems are ideal tools for the bigger picture in your supply chain—they help increase efficiency, reduce risk, and provide data-driven insights into business decisions. A strong platform helps streamline supply chain management and works in tandem with your company's strategy.

Some of the most potent tech a company can utilise concerns increasing clarity of data and costs. Many transportations spend management, data management, rate management, and cost allocation platforms provide decision-makers with a clear view of where and how they spend money throughout their supply chain.

At Trax, we've seen that choosing a platform that not only meets your needs but can integrate with vendors or clients helps mature your supply chain to the next level. For example, platforms that can automate purchase orders, depending on a set methodology, and send it directly to a vendor reduces lead time and frees up resources for other tasks.

4. Create alliances

One of the most important factors in managing a supply chain is having collaborative partners. Establishing a healthy relationship comes from a strong foundation of communication, common goals, increased transparency, and mutual collaboration. Without these alliances, your supply chain management can become a losing uphill battle that suffers in efficiency and profitability, and can even be detrimental to your own customers' experiences (through late or damaged deliveries).

To aid in strengthening a relationship, define a set of measurable objectives for continuous improvement, as well as a clear issue resolution plan. Tools like carrier scorecards are an excellent way to track performance, highlight and communicate any issues, and much more, helping to mature your company's transportation spend.

For example, at Trax, we believe that a collaborative relationship between the shipper, carrier, and Trax, helps all partners perform better and provide superior customer service. Let's say that customers complain of damaged shipments. Because of the collaborative carrier-shipper

relationship, the shipper can bring this issue to the carrier's attention. After discussion and investigation, it turns out that the shipper has a weakness in the packaging process that's resulting in easily damaged shipments. Without this collaborative relationship, the packaging issue may have taken months to identify, costing the shipper lost revenue and customers, as well as damage to the brand reputation.

5. Focus on the total cost of ownership

Progressive companies are shifting to focus on the total cost of ownership (TCO) rather than limiting their view to purchase costs. Considering that the acquisition costs normally amount to less than half of the total cost, it's logical for companies to consider TCO instead.

TCO offers a unique view that enables companies to break down costs and profit margins to the most minuscule of details. The more managers and/or department heads involved in the process, the more accurate the data is—another good reason to set up a supply chain council.

Going a step further from internal input, buyers and sellers can work together to reduce TCO. At Trax, we've found this to often be one of the most efficient cost-cutting policies that large companies can implement.

Prioritising TCO may seem like a foreign concept to some corporations, as the spotlight is often on cutting direct costs rather than focusing on value. Yet, focusing on working with selected investors that can help reduce cost significantly through either quality, timeliness, risk management, or otherwise can be much more fruitful than sending out the traditional tender.

6. Strategically source suppliers

Shifting focus to TCO rather than the bottom line on a bid requires you to look for suppliers who share the same mind-set. Factors other than price can have a huge impact throughout the entire process, either lowering or raising costs significantly. For example, suppliers who provide low costs but come with low quality can result in refunds (lost money) or lost sales—in the end, costing you a lot of money. Operating, training, maintenance, warehousing (especially if goods need special warehousing), quality levels, and transportation are all costs that must be considered.

Creating a dynamic procurement department that can source a strong partner equipped with the right mind-set can help offset some costs. This helps make the entire process more lucrative in the long run.

7. Move contract management to the supply chain

Centralising contracts in the supply chain can be one of the most effective practices in contract management. When contracts are scattered throughout multiple divisions, such as finance, legal, purchasing, or operations, it can lead to overlooking important factors or worse—losing entire contracts. Having the supply chain management division handle all contracts ensures more compliance, better contract standardisation, and a more detailed perspective. Signing, maintaining, and revising contracts becomes more streamlined and efficient.

In addition, centralising contracts to the supply chain division gives leaders the ability to leverage the company's overall spend in services, which can lead to greater savings and minimised costs, as well as improved risk mitigation.

8. Optimise inventory for reduced cost

Inventory management is often a disregarded, yet integral, part of supply chain cost management. Warehousing practices vary in such a way that it's difficult for companies to

pinpoint the best strategy while positively impacting the bottom line.

The cost of holding inventory can reach up to a colossal 40% of the original acquisition cost. Hence, competitive companies find ways to better manage inventory strategies in order to lower the TCO and increase profit margins.

Toyota is a great example of the need for mature transportation spend management. The company has a renowned just-in-time inventory and manufacturing process. Toyota doesn't hold inventory at all.

Parts arrive and go directly to manufacturing, and then products are released to the market. Zero inventory, zero cost. Without the mature transportation management element, there's a large risk to Toyota—spot freight rates, high claims volumes, late deliveries, accessorial charges, and other factors that could easily result in severe financial losses. Mature transportation spend management makes Toyota's extremely optimised, low-cost inventory process possible.

9. Establish regular reviews

It's crucial to constantly monitor and evaluate your supply chain in order to maintain a high standard. Regular reviews and consistent data collection and analysis not only help fine tune your supply chain management, but it gives the visibility you need to mitigate future risk.

For example, Trax's Transportation Spend Management (TSM) Maturity Model is a framework that provides a roadmap for large, global enterprises to go from a lack of visibility and control to a fully optimised transportation supply chain through detailed, accurate data. As companies mature in transportation spend and utilise tools, such as carrier scorecards or forecasting and budgeting, your ability to be proactive rather than reactive exponentially increases. Evolving through the maturation of efficiency optimization, financial optimization, etc., provides insights into risks and allows for data- informed business decisions now and in the future.

10. Set control and risk levels

Identifying risk factors throughout the supply chain process can transform your processes to be more flexible and prepared to deal with any issues that may arise.

One of the main areas where risk should be identified is in the sourcing decision process, as many external factors play a part in increasing risk. To mitigate risk in sourcing:

- Identify risks and adopt methodologies that help identify them throughout the entire sourcing process.
- Analyse risk probabilities and effects.
- Evaluate the cost and financial impacts incurred if a risk was to happen.
- Grade or evaluate risks to prioritise them for the scrutiny and frequency in which they should be monitored.

2.12 Obstacles Streamlined Supply Chain Management

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 centralised 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 customisations, 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 modernising 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.

2.13 Unit End Questions

A. Descriptive Questions Short Questions

1. What is supply chain management. Explain its advantages and disadvantages?
2. Define cycle time in SCM
3. Write 3 importance of SCM?
4. Write a short note on supply chain strategy?
5. What are the obstacles of streamlined SCM?

Long Questions

1. What are the five dimensions of Supply Chain Management?
2. Explain in detail process view of supply chain management

3. Differentiate between SCM and logistics management?
4. Explain the role of SCM manager in a company?
5. Explain the cycle view of supply chain process?

B. Multiple Choice Questions

1. Positive, long term relationships between supply chain participants refers to
    a. Co-operation
    b. Tailor logistics
    c. Partnership
    d. Supply chain management

2..... includes design and administration of system to control the flow of materials, work in progress and finished inventory to support business unit strategy
    a. Logistics management
    b. Materials management
    c. Bills of materials
    d. None of these

3..... encompasses all activities associated with the flow and transformation of goods from the raw material stage, through to the end user, as well as the associated information flows.
    a. Production line
    b. Supply chain
    c. Marketing channel
    d. Warehouse

4. Intermediaries play an important role in matching …….
    a. Dealer with customer
    b. Manufacture to product
    c. Information & promotion
    d. Supply & demand

5. The purpose of supply chain management is
    a. Provide customer satisfaction
    b. Improve quality of a product
    c. Integrating supply and demand management
    d. Increasing production

Answer: 1.d, 2.a, 3.b, 4.d, 5.c

2.14 References

- Bowersox, D. J., Closs, D. J., Cooper, M. B., & Bowersox, J. C. (2013). Supply Chain Logistics Management (4th ed.). New York, NY: McGraw-Hill.
- Brealey, R. A., Myers, S. C., & Allen, F. (2017). Principles of Corporate Finance (12th ed.). New York, NY: McGraw-Hill.

- Chea, A. (2011). Activity-Based Costing System in the Service Sector: A Strategic Approach for Enhancing Managerial Decision Making and Competitiveness. International Journal of Business and Management, 6(11), 3–10.
- Cooper, R., & Kaplan, R. S. (1988). Measure Costs Right: Make the Right Decisions. Harvard Business Review, 66(5), 96–103.
- Coyle, J. C., Langley, C. J. Jr., Novak, R. A., & Gibson, B. J. (2017). Supply Chain Management: A Logistics Perspective (10th ed.). Boston, MA.

Certificate/Diploma Course in
Retail and Sales Management
DRS6–Logistics and Supply Chain Management

UNIT- 3 DYNAMICS OF SUPPLY CHAIN

STRUCTURE

3.0 Objectives
3.1 Introduction
3.2 Supply Chain Integration
3.3 Push and Pull Based Supply Chain
3.4 Demand Forecasting in Supply Chain
3.5 Managing Inventory in SC Environment
3.6 Transportation in SC Environment
3.7 Strategic Alliances
3.8 Third Party and Fourth Party Logistics
3.9 Retailer -Supplier Partnership (Rsp)
3.10 Supplier Evaluation and Selection
3.11 Use of Best Practices and Information Technology (It) In Supply Chain Management
3.12 Unit End Questions
3.13 References

3.0 Objectives

After completing this Students will be able to

- Define Supply chain integration
- Understand Retailer and supplier partnership relationship.
- Explain Strategic alliances.
- Explain Push and pull based in supply chain management.

3.1 Introduction

The dynamics of supply chain management represent the intricate and ever-changing interactions, challenges, and adaptations that occur within the network of suppliers, manufacturers, distributors, retailers, and customers involved in the production and distribution of goods and services. In a globalized and interconnected business environment, supply chains have become complex ecosystems that respond to numerous internal and external factors, leading to a continuous process of adjustment and optimization.

The dynamics of supply chain management encompass a range of factors:

1. Demand Variability: Fluctuations in consumer demand, influenced by factors such as seasons, trends, and economic conditions, create challenges in matching production and distribution with changing consumption patterns.

2. Supply Variability: Suppliers' capabilities, lead times, and disruptions can significantly impact the availability of raw materials, components, and finished products, leading to uncertainty within the supply chain.

3. Globalization: Supply chains often span multiple countries, each with different regulations, cultures, and infrastructures. This global nature introduces complexities in logistics, customs,

and risk management.
4. Technology and Innovation: Rapid advancements in technology, including IoT, AI, and blockchain, are transforming supply chains by improving visibility, automation, and data-driven decision-making.
5. Sustainability and Environmental Concerns: Increasing awareness of environmental impact drives organizations to consider eco-friendly practices, leading to changes in sourcing, packaging, transportation, and waste management.
6. Collaboration and Relationships: Successful supply chains rely on strong relationships and collaboration between partners to ensure efficient communication, transparency, and coordination.
7. Risk Management: Disruptions such as natural disasters, political instability, and economic crises can disrupt supply chains. Managing and mitigating these risks is crucial for maintaining operations.
8. Lean and Agile Strategies: Organizations must strike a balance between lean strategies that minimize waste and agile strategies that allow quick responses to changes in demand or supply.
9. Customer Expectations: Changing customer preferences and demands for personalized products, faster deliveries, and transparent tracking influence supply chain strategies.
10. Regulatory Compliance: Adhering to various regulations and standards across different regions adds complexity to supply chain operations.
Navigating the dynamics of supply chain management requires a holistic approach that considers the interconnectedness of various elements and the ability to adapt to evolving challenges and opportunities. Organizations must embrace flexibility, innovation, and a commitment to continuous improvement to effectively manage supply chain dynamics and remain competitive in an ever-changing business landscape.

3.2 Supply Chain Integration

Supply chain integration is the cooperation of buyers and sellers, with the goal that all parties benefit from the relationship. The resulting supply chain partnerships result in improved quality, improved delivery, and an improved bottom line for everyone involved in the supply chain—and in addition, the final customers get better quality, reliable on-time delivery, and more responsive service.

What is Supply Chain Integration?

At the simplest level, supply chain integration involves communication between a buyer and a seller. The objective is to establish an ongoing working relationship such that the buyer's needs are better known and understood by the supplier.

Supply chain integration often takes the form of integrated computer systems. For example, the supplier's computer system may be set up to deliver real-time data to the buyer's computer. This allows the buyer to know:

- The current status of all orders.
- Which products are in the supplier's inventory?
- The status of products being manufacturer for the buyer.
- When an order or product is ready to ship.

- Tracking of the shipment.

This simple form of supply chain integration can often be seen when buying from an online retailer. You can see immediately whether the item is in stock. After placing an order, you receive notices that inform you when the order has been received, when it is ready for shipment, and when the item has been shipped, along with the tracking number.

Two-Way Supply Chain Integration

The next step in supply chain integration is for the buyer's computer system to send information directly to the seller's, providing two-way communication. For example, the buyer's computer system may automatically monitor their incoming orders and production status, and use that information to issue purchase orders directly to the supplier's computer systems. With an automated, synergistic two-way flow of information, the buyer's incoming orders might even directly trigger increased production by the supplier, without any human interaction. A buyer's computer system might even automatically check with several suppliers to find needed in-stock items, and place the appropriate orders to ensure that the purchased materials arrive when they are needed.

Complex Supply Chain Integration

The integration of the supply chain can be extended as far as is needed. Partners in a supply chain can include manufacturers, distributors, importers, consumers, banks, storage facilities, insurance companies, and transportation companies. Any organization that is a part of the supply chain can be a part of an integrated and automated system for that supply chain. The objective is improving efficiency and quality, eliminate waste, and reduce costs in every part of the manufacture and delivery of a product simply by working together.

Supply chain integration can help to eliminate problems such as:

- High inventory costs.
- Overproduction and underproduction.
- Production slowdowns resulting from a lack of purchased materials or components.
- Unreliable delivery or quality of purchased materials or components.
- Poor service from suppliers.
- High transportation costs from frequent use of expedited shipping.
- Confused purchasing processes.
- Inadequately managed supplier relationships.
- Supplier errors and order processing problems.

Supply Chain Integration – A Multi-Organization Structure

The purchasing department usually takes the lead in establishing supply chain integration. It begins with a leader identifying supply chain problems and ways those issues can be resolved. Goals are established for improving the supply chain, and a plan is created that lays out what needs to be done. At this point, the purchasing department begins to work with suppliers and vendors to implement changes in the supply chain that will achieve the stated objectives.

For supply chain integration to work, there must be benefits for both parties. This may take spending time explaining the benefits of supply chain integration to vendors and suppliers, and working out details so that both parties benefit. Keep in mind that this is a partnership, in which you are asking your suppliers to make certain commitments to you. They'll expect that you also make some commitments that benefit them. There must be a shared interest in making supply

chain integration work.

Establishing supply chain integration is an incremental process. The typical approach is to make small changes, collect feedback, and then make further adjustments. This is a continual process, resulting in improvements that build on other improvements. Significant steps forward can be taken quickly, while the continuous feedback helps keep everything going in the right direction.

Elements of Supply Chain Integration

There are four key components to a successful implementation of supply chain integration. These are known as the Four C's of Supply Chain Integration.

Communication

As mentioned, communication is key. Everyone involved in the supply chain needs to be well informed, allowing them to quickly adjust their operations to meet changes in demand and new business opportunities. This is often done using integrated computer systems, but direct channels of communication between key people should also be in place.

Customers

The focus should always be on the final customer's needs, and what the customer values and is willing to pay for. This requires the lead organization to have a close relationship with their customers.

The lead organization must make others in the supply chain aware of the final customer's needs, and how their part of the supply chain impacts the ability to meet those needs. Everything must be focused on the final customer's needs; ultimately, they are the ones paying the bills for everyone else in the supply chain.

Collaboration

To be effective, supply chain integration requires good relationships among all the members of the supply chain. This is called collaboration. Each participant in the supply chain should be interested in developing their suppliers, including providing training to improve their product knowledge and understanding of the markets being served. They may even become involved in joint product development projects. Supply chain integration is a collaborative partnership.

Cooperation

The sharing of supply and demand information is critical for the success. This may include information that is usually considered proprietary. However, without close cooperation, the members of the supply chain will not have the information they need to be responsive to customer needs.

Benefits of Supply Chain Integration

There are a number of benefits that result from effective supply chain integration.

Flexibility

An integrated supply chain results in improved ability to respond to rapid changes in the market. This is backed by a shared interest, throughout the supply chain, in getting things right the first time.

Improved Inventory Management

There will be fewer overstocked and understocked items. Overall you'll have smaller inventories, reducing storage costs and allowing quicker replacement of obsolete items.

This is the result of n improved ability to match inventory levels with customer demand.

Reduced Spending

In addition to reduced costs associated with inventory, costs for quality control and inspections, administrative activities, and purchasing will all go down. Transportation costs will even be reduced, due to optimization of loads and better forecasting.

Improved Suppliers

You'll have fewer and better suppliers. You'll have more confidence in the quality provided by those suppliers, and in their ability to deliver orders on time.

3.3 Push and Pull Based In Supply Chain

Every successful business relies heavily on efficient supply chain management to run its everyday operations. Some of the most successful companies in the world, like Amazon and Walmart, rely heavily on new and sophisticated techniques in supply chain logistics to run their operations. Hence, this is a

very active space that sees a lot of innovation in all aspects of the chain. Let's look at the Push and Pull strategies in supply chain management and see which approach works for which business.

Deeper Look into Supply Chains Strategies

From the procurement of raw materials to all the processing required and the final delivery of goods, companies rely on supply chain management to quickly and efficiently handle the procedure. Supply chains dictate when the product should be made, delivered to storage and centres, and delivered to a retail store or shipped. This is quite a complex task and relies heavily on future-proofing to account for delays and other volatilities. Push and Pull strategies in supply chain logistics help companies map out their supplies based on various factors based on their exact needs.

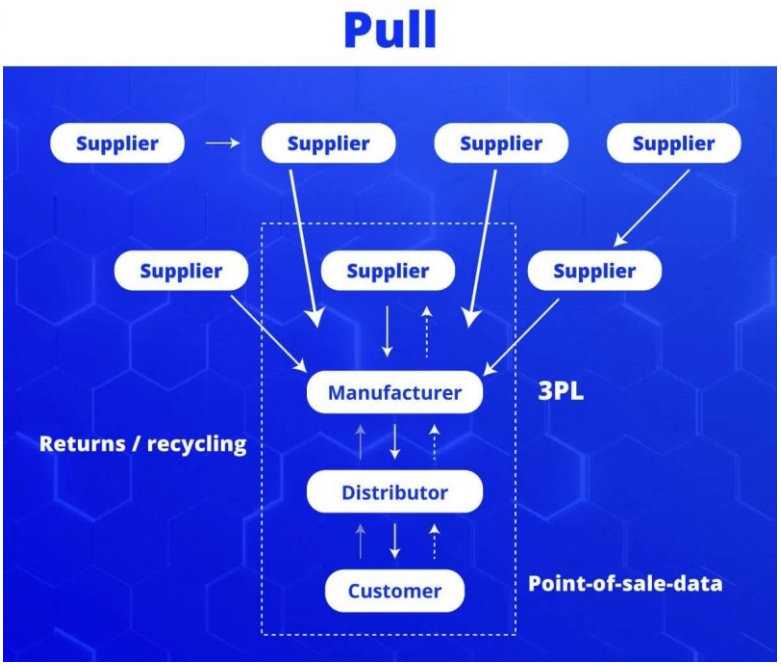


Fig: 3.1 Pull Supply Chain

Pull Supply Chain

Under the pull supply chain, the manufacturing and supply process is driven by actual customer demand. In this type of supply chain logistics, inventory is acquired on a need-basis. This type of planning benefits includes less wastage in the case of lower demand. The problem, however, is that the company might not have enough inventory to meet rising demands due to unforeseen factors. For example, an auto repair shop only orders the parts it needs. In this case, the business waits until it gets an order to procure the parts required for the repair.

Push Supply Chain

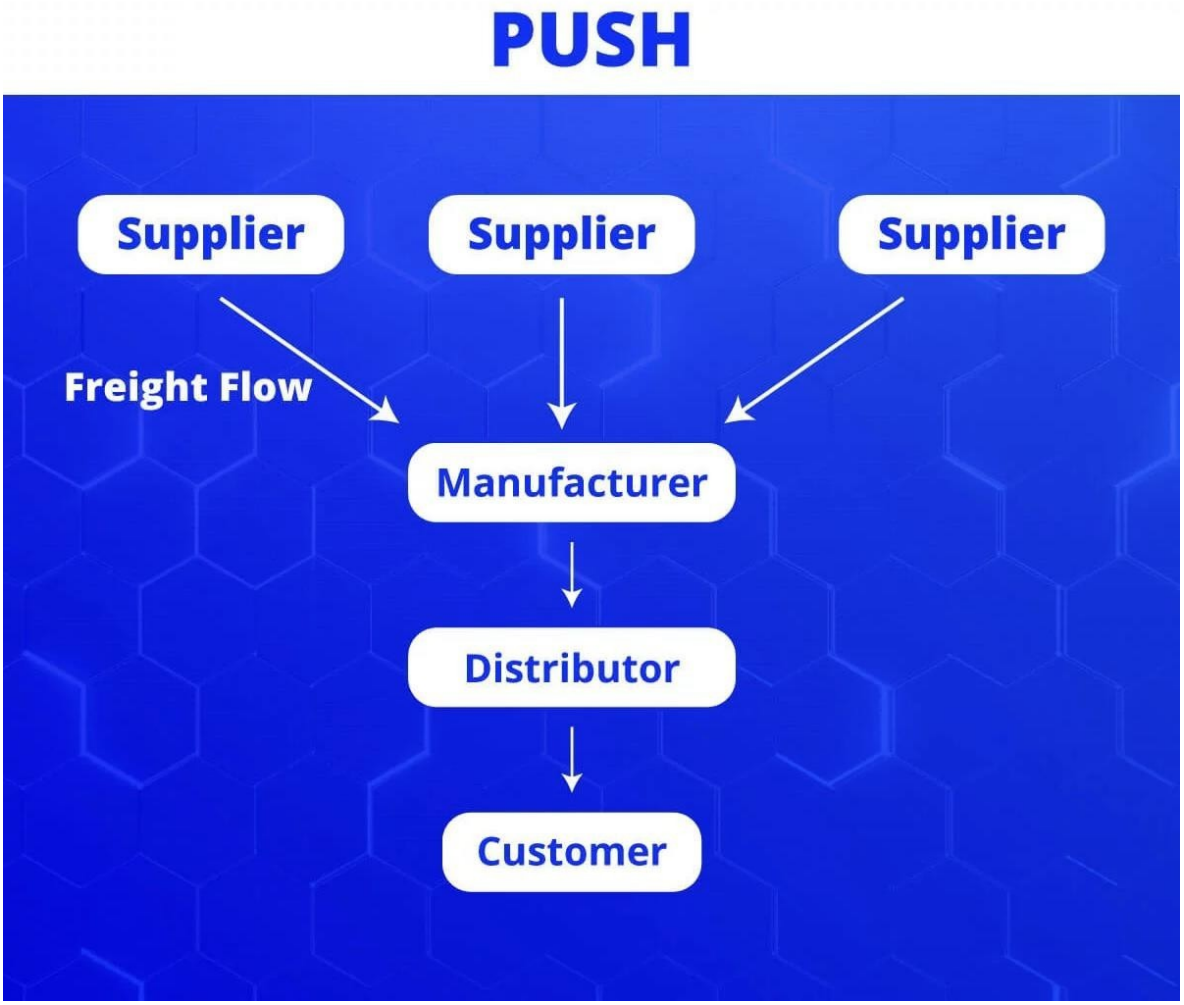


Fig: 3.2 Push Supply Chain

Under the push supply chain, the logistics are driven by long-term projections of customer demand. For example, at the end of the summer season, clothing brands start to manufacture more warm clothes. This type of planning becomes valuable to companies as it helps them plan for events in the future and be prepared when winter comes. This gives the companies time to meet their needs and time to figure out other logistics like where to store the inventory.

But instead of responding to actual demand, a push strategy relies on often wrong predictions. High variable expenses, divestments, discounting, missed sales, stock shortages, high levels of debt, and rescheduled production cycles are other drawbacks of this approach.

Push and Pull Strategies in Practise

In real life, no businesses rely entirely on either push or pull logistics but instead employ a mixture of the two to make the best use of them. Modern-day supply chain operations are very complex and consist of steps, from getting the raw materials to delivering the final product to the end consumer. The process roughly consists of the following steps:

- Determining the availability of raw materials. Even before the product can begin to be made, it is important to plan where and how the raw materials can be acquired cheaply.
- Processing the raw materials in a factory to yield the final products. This step varies from company to company, like food-based products, cloth-based products, etc.
- Then the finished product is taken to a storage facility or a distribution facility.
- The packaged product is taken to a retail store or shipped directly to the customer as needed.
- Most supply chains in the world resemble this basic outline. Now, push and pull strategies can be employed by planners by taking into account the expected demand and other factors. The most successful shipping companies like Walmart and Amazon research the various factors that determine demand and incorporate that knowledge into their supply chain.

Amazon is one of the world's biggest online retailers, managing billions of dollars' worth of inventory each year. Push and Pull logistics are a big part of their inventory management. Amazon's warehouses are strategically placed, moving closer and closer to main metropolitan areas and city centres. As a result, it uses a pure push strategy for the products it stores in its warehouses based on the downstream demand forecast. On the other hand, it uses a pure pull strategy when it sells products from third-party sellers to minimise its own risk for unsold inventory.

A Closer Look to Pull and Push Transactions

A "pull-based transaction" happens when a merchant pulls the transfers from the customer's account through a debit transaction. In such a method, the merchant pulls funds from the customer's account to proceed with the sales transaction.

A "push transaction" is when a merchant provides the customer with a "request for pay" token to receive the funds. The best example of such transactions is cryptocurrency transfer. In push transactions, customers push the payment to the desired address, and when the receiver is notified of the incoming fund, they proceed with the sales transaction. Push payments just take seconds compared to pull transactions.

It has been found that push payments offer several perks over pull payments in terms of enhanced security, better scalability, and faster Settlement. They offer better settlements compared to pull. This is because the merchant is paid instantly when the customer finishes the push request, and if any dispute arises, the merchant can revert or push back the funds immediately. Such transactions help in achieving vibrant economic activity.

Better automation can also be achieved with push transactions as bots. AI-enabled systems can create "request to pay" tokens, present them as a QR code, and send links to customers without human intervention.

The Verdict- Combination of PULL and PUSH Strategy

As we have understood what is pull and push strategy is, let's understand what happens when both the strategies are combined. Many tech giants and even retailers use a pull-push strategy. In this combined approach, the approach aims to "push" customers to choose particular options and once options are chosen, the customer's order "pulls" demand through the company's supply chain.

However, they don't tend to let customers choose just any option. Instead, they regulate the options provided to customers to depreciate lead times on delivery.

Major brands use a combination of push and pull techniques. But here, it is crucial to note that, to build the optimal Push versus Pull combination, there is no one-size-fits-all approach to develop the ideal Push vs. Pull mix. When designing their specific combination of Push and Pull strategies, brands must understand their campaign objectives, target audience, and budget constraints.

You can respond effectively to evolving consumer demands by combining both Pull and Push approaches while maintaining economies of scale within your current operations.

3.4 Demand Forecasting In Supply Chain

Accurate and effective demand forecasting is a game-changer for your business. Its primary purpose is to ensure that companies meet expected customer demand, but it can be used for so much more.

Planning for demand will help allocate resources, measure a business's strength, and plan strategies to exploit opportunities and gain market share.

Demand forecasting helps to understand and predict demand, maintain the right amount of supply to meet that demand, and to manage product lifecycle within an industry.

Demand Forecasting is the process that enables demand planners and supply chain professionals to estimate customer demand for a product based on prior sales data and other contributing data factors. Creating a demand forecast helps companies better understand, predict, and plan their products and make better business decisions. The demand plan is used to ensure that there will be enough product supply to meet customer demand.

This is a key component of the supply chain management process because it also informs the planning aspects of other supply chain processes including material procurement, purchasing, logistics, and distribution.

Why demand forecasting?

Demand forecasting is essential to the planning process and allows companies to improve the ability to determine future demand by relying on internal data such as historical data, and external data such as weather, seasonal variations, supply chain constraints, etc., to determine how much supply needs to be produced to meet demand. When done well, demand forecasting can help companies make informed decisions that help them create enough supply to fulfil customer demand, gain insight to circumvent possible supply chain constraints, and potentially gain an advantage over their competitors.

For example, if a toy retailer realises that shipments for one of the season's most popular toys could be delayed due to port congestion, demand planners would evaluate the impact of the reduced availability and how it might affect downstream sales for them and their competitors. The demand forecast might have to be reduced (since if there are no products on the shelf—there

will be no sales) but predicted sales of similar products that are available might need to increase. The demand planners would monitor this situation closely since the consequence on market share and long-term sales could be significant.

Lead Times and Service Levels

The Demand forecast is produced by Demand Planning because of supply chain activity lead times that consist of buy, make, and sell activities and customer service levels which are calculated from the customer expected lead time. This is the crucial balance of how long it takes for a business to deliver its product against how long a customer is willing to wait for it.

Therefore, businesses must create a demand forecast when their supply chain activity lead times are longer than customer expected order lead times. Optimising supply chain activity lead times and improving customer service levels is an essential business activity and is a reason why demand forecasting is done.

How does demand forecasting work?

Demand forecasting works like this; planners create a forecast using statistical or calculated methods. This baseline forecast can then be augmented by other forecasts such as from Sales and Marketing as well as insights from Product Management and Finance. The planners will measure KPIs such as forecast accuracy and bias, perform scenario or 'what if' planning, and ultimately create an enriched consensus forecast.

To build an accurate demand forecast, a planner must gather transactional data into measures and map it to dimensions, hierarchies, levels, and attributes that represent the business structure. This information, which is typically very large in size, will be managed in a software program, which will use calculations, time series models, or machine learning (ML) technology to generate the demand forecast. From there, the planner visualizes the forecast and uses exception management to identify issues that need to be resolved.

Key issues to be resolved could include managing product life cycles such as new product introductions, product transitions, and end of life dates as well as forecast accuracy, bias, and outliers. Planners can make forecast comparisons through tournaments, scenarios, and simulations to identify improvements and any necessary adjustments can be applied as forecast overrides.

The refined demand forecast will be assessed in Demand Reviews with Sales and Marketing. This team will consider options to close any gaps in the forecast to budget and exploit market share opportunities using events, promotion, and pricing strategies. Ultimately, a consensus forecast will be created, authorised, and used as a key input to the monthly Sales and Operations Planning meeting, and published for Supply Planning to use for purchasing, manufacturing, and delivery planning.

Types of demand forecasting

There are a few types of demand forecasting models that can be used by businesses to help determine future demand for their products.

- **Manual Demand Forecasting** relies on planners inputting a forecast manually instead of using a forecast engine or automated calculation. This is considered the most basic method of forecasting but can be used even in sophisticated solutions where the products are unforecastable or rather, cannot be reliably forecasted by statistics.

- **Passive Demand Forecasting** relies on historical data to predict future demand. It‟s considered a simpler method of forecasting and can be useful for organizations with strong historical sales data.
- **Active Demand Forecasting** uses external data like market research and additional data to determine potential demand from customers. This method can be more effective for companies that are newer (and lack substantial historical sales data) and for companies that are in a high-growth phase.
- **Macro-level Demand Forecasting** relies on external conditions that could directly affect or influence the business and can help planners build out a strategy to capitalise on trends or influential factors that could drive business decisions.

Additional forecasting methods to consider include internal business forecasting, short-term forecasting, and long-term forecasting. Internal business forecasts help companies to focus on operational risks and opportunities within their own business and make adjustments that align with business goals.

Short-term forecasts use demand sensing and shaping at a granular level (products, customers, or days/weeks) and focus on a forecast horizon of a few months. Medium-term forecasts will be at more aggregated levels such as Product Category, Customer, and Month for a forecast horizon of 2 to 12 months. Long-term forecasts capture projected market and industry trends that are 1-2 years out and can help influence the types of products a business may want to carry based on consumer trends. Very long-term forecasts focus on bigger-picture industry developments that are 5+ years away and help companies plan for investment and growth in certain areas of their business.

Demand forecasting for your business

Overall, demand forecasting helps companies not only predict potential demand, but also develop effective capacity planning and inventory management to ensure that there is enough supply on hand to meet demand in each region, and each channel that a company does business.

3.5 Managing Inventory In SC Environment

What Is Inventory Management?

Inventory management helps companies identify which and how much stock to order at what time. It tracks inventory from purchase to the sale of goods. The practice identifies and responds to trends to ensure there's always enough stock to fulfil customer orders and proper warning of a shortage.

Once sold, inventory becomes revenue. Before it sells, inventory (although reported as an asset on the balance sheet) ties up cash. Therefore, too much stock costs money and reduces cash flow.

One measurement of good inventory management is inventory turnover. An accounting measurement, inventory turnover reflects how often stock is sold in a period. A business does not want more stock than sales. Poor inventory turnover can lead to dead-stock, or unsold stock.

Why Is Inventory Management Important?

Inventory management is vital to a company's health because it helps make sure there is rarely too much or too little stock on hand, limiting the risk of stock-outs and inaccurate records.

Public companies must track inventory as a requirement for compliance with Securities and

Exchange Commission (SEC) rules and the Sarbanes-Oxley (SOX) Act. Companies must document their management processes to prove compliance.

Benefits of Inventory Management

The two main benefits of inventory management are that it ensures you're able to fulfil incoming or open orders and raises profits. Inventory management also:

- Saves Money:
  Understanding stock trends means you see how much of and where you have something in stock so you're better able to use the stock you have. This also allows you to keep less stock at each location (store, warehouse), as you're able to pull from anywhere to fulfil orders — all of this decreases costs tied up in inventory and decreases the amount of stock that goes unsold before it's obsolete.
- Improves Cash Flow:
  With proper inventory management, you spend money on inventory that sells, so cash is always moving through the business.
- Satisfies Customers:
  One element of developing loyal customers is ensuring they receive the items they want without waiting.

Inventory Management Challenges

The primary challenges of inventory management are having too much inventory and not being able to sell it, not having enough inventory to fulfil orders, and not understanding what items you have in
inventory and where they're located. Other obstacles include:

- **Getting Accurate Stock Details:**
  If you don't have accurate stock details,there's no way to know when to refill stock or which stock moves well.
- **Poor Processes**:
  Outdated or manual processes can make work error-prone and slow down operations.
- **Changing Customer Demand:**
  Customer tastes and needs change constantly. If your system can't track trends, how will you know when their preferences change and why?
- **Using Warehouse Space Well:**
  Staff wastes time if like products are hard to locate. Mastering inventory management can help eliminate this challenge.

Learn more about the challenges and benefits of inventory management.

What Is Inventory?

Inventory is the raw materials, components and finished goods a company sells or uses in production. Accounting considers inventory an asset. Accountants use the information about stock levels to record the correct valuations on the balance sheet.

Learn more about inventory in the article "What Is Inventory?".

Inventory vs. Stock

Inventory is often called stock in retail businesses: Managers frequently use the term "stock on hand" to refer to products like apparel and housewares. Across industries, "inventory" more broadly refers to stored sales goods and raw materials and parts used in production.

Some people also say that the word "stock" is used more commonly in the U.K. to refer to inventory. While there is a difference between the two, the terms inventory and stock are often interchangeable. **What Are the Different Types of Inventory?**

There are 13 different types of inventory: raw materials, work-in-progress (WIP), finished goods, decoupling inventory, safety stock, packing materials, cycle inventory, service inventory, transit, theoretical, excess and maintenance, repair and operations (MRO). Some people do not recognise MRO as a type of inventory.

Types of Inventory

1. **Raw Materials**: Raw materials are the materials a company uses to create and finish products. When the product is completed, the raw materials are typically unrecognisable from their original form, such as oil used to create shampoo.
2. **Components:** Components are like raw materials in that they are the materials a company uses to create and finish products, except that they remain recognisable when the product is completed, such as a screw.
3. **Work In Progress (WIP):** WIP inventory refers to items in production and includes raw materials or components, labor, overhead and even packing materials.
4. **Finished Goods:** Finished goods are items that are ready to sell.
5. **Maintenance, Repair and Operations (MRO) Goods:** MRO is inventory — often in the form of supplies — that supports making a product or the maintenance of a business.
6. **Packing and Packaging Materials:** There are three types of packing materials. Primary packing protects the product and makes it usable. Secondary packing is the packaging of the finished good and can include labels or SKU information. Tertiary packing is bulk packaging for transport.
7. **Safety Stock and Anticipation Stock:** Safety stock is the extra inventory a company buys and stores to cover unexpected events. Safety stock has carrying costs, but it supports customer satisfaction. Similarly, anticipation stock comprises of raw materials or finished items that a business purchases based on sales and production trends. If a raw material's price is rising or peak sales time is approaching, a business may purchase safety stock.
8. **Decoupling Inventory**: Decoupling inventory is the term used for extra items or WIP kept at each production line station to prevent work stoppages. Whereas all companies may have safety stock, decoupling inventory is useful if parts of the line work at different speeds and only applies to companies that manufacture goods.
9. **Cycle Inventory**: Companies order cycle inventory in lots to get the right amount of stock for the lowest storage cost. Learn more about cycle inventory formulas in the "Essential Guide to Inventory Planning."
10. **Service Inventory:** Service inventory is a management accounting concept that refers to how much service a business can provide in a given period. A hotel with 10 rooms, for example, has a service inventory of 70 one-night stays in each week.
11. **Transit Inventory**: Also known as pipeline inventory, transit inventory is stock that's moving between the manufacturer, warehouses and distribution centres. Transit inventory may take weeks to move between facilities.
12. **Theoretical Inventory**: Also called book inventory, theoretical inventory is the least

amount of stock a company needs to complete a process without waiting. Theoretical inventory is used mostly in production and the food industry. It's measured using the actual versus theoretical formula.

13. **Excess Inventory**: Also known as obsolete inventory, excess inventory is unsold or unused goods or raw materials that a company doesn't expect to use or sell but must still pay to store.

Inventory Management Process

If you produce on demand, the inventory management process starts when a company receives a customer order and continues until the order ships. Otherwise, the process begins when you forecast your demand and then place POs for the required raw materials or components. Other parts of the process include analysing sales trends and organising the storage of products in warehouses.

How Inventory Management Works

The goal of inventory management is to understand stock levels and stock's location in warehouses. Inventory management software tracks the flow of products from supplier through the production process to the customer. In the warehouse, inventory management tracks stock receipt, picking, packing and shipping.

Inventory Management Techniques and Terms

Some inventory management techniques use formulas and analysis to plan stock. Others rely on procedures. All methods aim to improve accuracy. The techniques a company uses depend on its needs and stock.

Find out which technique works best for your business by reading the guide to inventory management techniques. Here's a summary of them:

- **ABC Analysis**:
  This method works by identifying the most and least popular types of stock.
- **Batch Tracking**:
  This method groups similar items to track expiration dates and trace defective items.
- **Bulk Shipments:**
  This method considers unpacked materials that suppliers load directly into ships or trucks. It involves buying, storing and shipping inventory in bulk.
- **Consignment**:
  When practicing consignment inventory management, your business won‟t pay its supplier until a given product is sold. That supplier also retains ownership of the inventory until your company sells it.
- **Cross-Docking:**
  Using this method, you‟ll unload items directly from a supplier truck to the delivery truck. Warehousing is essentially eliminated.
- **Demand Forecasting:**
  This form of predictive analytics helps predict customer demand.
- **Drop shipping:**
  In the practice of drop shipping, the supplier ships items directly from its warehouse to the customer.
- **Economic Order Quantity (EOQ):**

This formula shows exactly how much inventory a company should order to reduce holding and other costs.

- **FIFO and LIFO**:
  First in, first out (FIFO) means you move the oldest stock first. Last in, first out (LIFO) considers that prices always rise, so the most recently-purchased inventory is the most expensive and thus sold first.
- **Just-In-Time Inventory (JIT):**
  Companies use this method in an effort to maintain the lowest stock levels possible before a refill.
- **Lean Manufacturing:**
  This methodology focuses on removing waste or any item that does not provide value to the customer from the manufacturing system.
- **Materials Requirements Planning (MRP):**
  This system handles planning, scheduling and inventory control for manufacturing.
- **Minimum Order Quantity:**
  A company that relies on minimum order quantity will order minimum amounts of inventory from wholesalers in each order to keep costs low.
- **Reorder Point Formula:**
  Businesses use this formula to find the minimum amount of stock they should have before reordering, then manage their inventory accordingly.
- **Perpetual Inventory Management**:
  This technique entails recording stock sales and usage in real-time. Read "The Definitive Guide to Perpetual Inventory" to learn more about this practice.
- **Safety Stock**:
  An inventory management ethos that prioritises safety stock will ensure there‟s always extra stock set aside in case the company can‟t replenish those items.
- **Six Sigma:**
  This is a data-based method for removing waste from businesses as it relates to inventory.
- **Lean Six Sigma**:
  This method combines lean management and Six Sigma practices to remove waste and raise efficiency.

Four ways of ensuring more efficient supply chain inventory management

1. Maintain alternative suppliers for your core business

Having alternative suppliers spread across geographies is a great way to ensure that the supply of essential goods for your business remains uninterrupted. While this may not seem extremely efficient, it certainly helps mitigate risks from black swan events.

Another step is to maintain reserve or safety stocks to prevent operations from grinding to a halt completely.

Car manufacturer Volkswagen has regional supply chains in China and Europe. When the pandemic affected Volkswagen's supply chain in China, the company switched to its European suppliers and then switched back to China again when the pandemic shut down Europe, according to the survey report.

2. Re-evaluate your sourcing strategies and suppliers

In the survey, 44% of respondents believed their companies relied too much on suppliers from some countries. In the future, they would prefer securing suppliers from a wider range of countries, and possibly near-shore alternatives.

More businesses are evaluating sourcing strategies that involve local suppliers and greater transparency to build resilient supply chains that can be monitored more closely.

Some, like Schneider Electric, are planning to cut down their suppliers by half — from 12,000 to 5,000 by 2022-23 — to work closely with a select number of suppliers, according to the report.

3. Embrace technology and digital transformation of your supply chains

The survey reported that less than 40% of the companies have adopted digital platforms and advanced analytics, with less than a third using the cloud or IoT. That must change for inventory management to be effective.

Advanced inventory and warehouse management software can help companies tap into real-time data for better visibility and more accurate forecasting. AI and advanced analytics can help companies track crucial metrics, such as inventory turnover, gross margin, and customer order fill rate and improve overall supply chain visibility. Inventory management software helps companies understand how their goods move through their warehouses automatically.

4. Become less siloed and more collaborative as an organization

The goal of effective supply chain inventory management is to guarantee that the right goods are in the right place at the right time. Isolated departments and siloed organisational data reduce the transparency needed to ensure effective inventory management. That's why facilitating a smoother flow of information across departments is the key.

Conclusion

As the new normal becomes more uncertain, supply chain disruptions are likely to continue growing in scale and complexity. Besides following the above steps for supply chain inventory management, make inventory management strategies an essential part of your business plan to mitigate risks, revenue losses, and ensure business resilience.

3.6 Transportation In Supply Chain Environment

Transportation is the most essential component of a supply chain. It involves the delivery of products from the start to the end of a supply chain. For a supply chain to be deemed effective, the transportation segment must be managed efficiently. This involves making sure the transport and logistics strategy is dynamic and responsive to the demands of the market.

The transportation in a supply chain entails ferrying a product from a supplier to a customer or a distribution store by road, rail, pipeline, air or sea. Factors involved in transportation include cost, service/transit time and movement of products. These are the most pertinent issues in an effective supply chain. Others include integration among customers, carriers, and suppliers and information flow. Transportation is frequently used in the facilitation of a supply chain. Below are seven uses of transportation in supply chain management:

1. Transportation is used to reduce costs.

The transportation in a supply chain can be used to control costs in a business operation. Freight and fuel costs take up most of the logistics budget. Moving products from one location to another using one or a combination of the various modes of transportation is a cost-intensive affair. To control transportation costs and keep them as low as possible, conducting a full freight audit is

essential.

Luckily, technologies exist that make it possible to enhance transparency in transport and logistics. Companies that use technology and data can increase their awareness of both the supply chain network in general and how it interacts with the broader transportation ecosystem. The right data gives shippers insights into freight flows and other variables that are likely to impact transportation costs to various destinations. This gives them a broader insight into the transport ecosystem and how it affects the entire supply chain.



Fig: 3.2 Enhance Customer service

2. Transportation is used to enhance customer service.

The transportation in a supply chain can be used for customer service. As products move from one location to another, and from the supplier to the customer, the needs of the customer must be at the heart of the transportation system. Making sure products reach a customer in the condition they were shipped in and on time are essentials of transportation in a supply chain.

3. Transportation is used to segment shipments in supply chain.

The prioritisation of shipments is essential in transportation. The customers, products, time of year, and suppliers, among other factors, determine the urgency and importance of goods in transit. The transportation in supply chains must be segmented to reflect these often complex realities. This often requires a change in the mode of transport and settling on alternative carriers.

4. Transportation is used to synchronise with supply chain technology.

The daily monitoring of transportation operations is best handled by a transportation management software (TMS). Among activities tracked by a TMS are route planning, fleet management, fuel costing, supplier relations, cargo handling, and customer communications.

A TMS is highly effective in controlling and lowering transportation costs. For instance, according to Forbes, a TMS can reduce freight costs by 8%. While not all shipping companies are using a TMS, its uptake is on the rise as companies embrace the realities of efficient, cost-effective transportation.

5. Transportation is used to provide more supply chain options.



Fig: 3.3 Provide more supply chain options

The majority of products rely on multiple modes of transportation as they travel throughout the supply chain. Therefore, various modes of transportation are required for an effective freight transportation system. Such a system is ideally suited to support international and domestic supply chains.

As shown above, trucks are by far the most popular mode of transportation, making road transport a critical part of the supply chain. Pipelines are also highly popular, especially in the transportation of gaseous and liquid products. Items moved by air and road have a higher value per ton, meaning that these two modes have a higher value than the others.

The appropriate mode of transportation in a supply chain must be selected at every point of the transport and logistic cycle. Sometimes it takes a combination of modes of transport for a product to reach an end-user or a distributor.

6. Transportation is used to bypass geographical limitations.



Fig: 3.4 B**ypass geographical limitations**

Trucks have, for a long time, been the preferred mode of transportation in supply chain

operations. They traverse roads alongside railways to move products across the land efficiently. They feature a chassis, which can hold standard shipping containers. In the US alone, fifty million tons of products are freighted via trucks every day at the cost of more than $50 billion. In Canada, 730.6 million tons of commodities were freighted via trucks in 2014. Compare this to 310.3 million tons of freight transported by railway in the same year.

The reason trucks are the mode of choice when transporting shipments is because they can pass through terrains that other modes of transportation can't. For instance, trains travel to limited destinations, while air freight has weight and airport limitations. This leaves trucks as the most convenient for moving vast volumes of products cost effectively.

7. Transportation is used to boost the economy.



Fig: 3.5 Boost the economy

To freely move products from domestic to international markets and vice versa, an efficient transportation system is a must. The vast distances between farms, mines, urban centres and forests demand a sound transportation system so that manufactured products can reach customers as efficiently as possible.

3.7 Strategic Control

Strategic alliance or partnership is solely depended on trust, faith relationship between simultaneous stages in Supply Chain. This increases ability and dependability of various stages involved in the supply chain. As strategic alliances can be between two or more organisations so each stage should be managed by welfare of the others' and should not change or use that stages for own advantage without consideration of the organisation involved. This alliance is kept formal in relationship between two or more organisation to achieve some beneficial goals through business by supply chain. Here organisations also work on their desired needs. Some of the Strategic alliance resources are:

- Products
- Distribution channels
- Manufacturing capability

- Project funding
- Capital equipment
- Knowledge
- Expertise or intellectual property

This alliance is actually a collaboration of firms to work together to form a greater effect than before. There are some reasons which can improve the performance which are:

- Decision making is done by the consideration of other party.
- Easy coordination between the parties by their managers with the trust. This result in better operational implementation and scheme valuation.
- It will lead to redundancy due increase in supply chain productivity.
- This ensures proper sharing of sales and production information, hence helping in coordinate production and distribution decisions.

Above diagram shows the model of forming strategic alliances. Here operating strategy is divided into three structures:

- Industrial
- Organisational
- Government

Building strategic alliance and its trust

Building these types of alliances is totally dependent on Managers of the organization. Mostly this is done by sharing clean information trusted by every results matching with supply and demand throughout the supply chain processes and lower cost. Here it shows that better relationship helps to lower the cost between the supply chain stages.

Example: As far as trust over here is concerned a supplier can avoid forecasting about information received for the retailer. Similarly, the retailer can lessen the receiving effort by decreasing counting and inspections on the trust of the supplier's quality and delivery. This ensures better coordination between supplier and retailer. Walmart and P&G have been trying to build a strategic alliance that will help for better coordination and actions can be mutually beneficial.

A typical strategic alliance formation consists of some steps which are:

- Strategy Development: development involves feasibility of alliance, objectives and goals, decisions, focus on critical issues, technology and people with their challenges and resources.
- Partner Assessment: In this assessment partner's strength, potential, developing managing styles, preparing criteria for partner selection and understanding their motives for joining alliances.
- Contract Negotiation: It is the development of realistic objectives among the group and forming the high calibre or developing synergy. Consideration on security of information, termination clauses, and penalties for poor performance is formulated.
- Alliance Operation: it is linking of budgets and resources to fulfil the strategic priorities, measuring the performance etc.
- Alliance Termination: It is the winding down of partnership due to failure or not meeting the clauses decided before.

Advantages of Strategic Alliance

- Each partner can concentrate on different stages of the supply
- Developing competences and learning form the partners
- Suitability and protection of resources is maintained
- Developing low cost models hence financial benefit.

Types of strategic alliances

- Joint venture: In this type of alliance two or more firms create legally independent company to develop competitive advantage
- Equity Strategic Alliance: There is sharing of different percentages of the company.
- Non-equity Strategic Alliance: It is alliance on a contractual- relationship to share the unique resources.
- Global Strategic Alliances: It is formed between a company and foreign company.

Achieving Strategic Alliance by any Organization:

It is agreed that the cooperation and the trust in supply chain are quite important and develops the value but it very hard to maintain, sustain and develop till the last point. Therefore two views have been analysed to categorise into any supply chain relationship.

Those views are as follows:

1. Deterrence-based view: In this view a variety of formal contracts are formed amongst to ensure cooperation
2. Process-based view: with this view the development of trust and cooperation is built over a long time with the series of interactions between the parties.

In practical situation the contract established between parties and design of such contract is impossible to make where all contingency is accounted in future by all parties so the only way out here is to trust each other and have a long relationship relying on developed contract.

Example: If there is a situation where supplier sign the initial contract containing the contingencies with the manufacturers and then those manufacturers turns out of not referring that contract again. So here hope remains to resolve such contingencies with the negotiation.

3.8 Third Party And Fourth Party Logistics

Fourth-party logistics (4PL) providers have a huge role within the supply chain. Not only do they assume many of the same roles as third-party logistics (3PL) providers, but they also take on a bigger responsibility in helping the business clients reach their goals.

The main difference between a 3PL vs. 4PL provider is the level of accountability and control. 4PLs are more like trusted advisors and the customer often relies heavily on their data and services to grow and meet their business goals. Depending on your business size and goals, one of these options will be right for you. For a deeper look at the difference between these two types of logistics management, here's what you need to know.

What Is 4PL?

Fourth-party logistics is a model in which manufacturers outsource both the organization and management of their supply chain to an external provider. 4PL offers a higher level of effective supply chain management to customers, which allows manufacturers to completely outsource their logistics process to external professionals for better management.

For example, the manufacture of a product will outsource aspects such as logistics, packaging,

warehousing, and delivery of their products to a 4PL company. A 4PL company will then take control all these operations so that the manufacturer or retailer can focus on other aspects of their business.

These services include:

- Freight sourcing strategies
- Logistics
- Analysis of transportation expenses
- Analysis of carrier performance
- Effective 3PL management
- Business planning
- Project management
- Management of inbound, outbound, and reverse logistics
- Coordination of a wide supplier base
- Network analysis and designs
- Analysis of capacity utilisation
- Inventory planning and management

Advantages of 4PL

- Wider Management of Operations: Shipping, distribution, warehousing, physical sites, and information flow are all managed by the provider.
- Information Technology: Software and automation are processes included in 4PL services to improve communication across the network. Providers can offer valuable information technology and software that increases visibility on a real-time basis.
- Solution-Oriented Methods: 4PL providers aim to design the solution first to meet the business' requirements. They have expertise of end-to-end operations that relate to warehousing, distribution, freight, and information technology, and provide the best solutions for the client.

Disadvantages of 4PL

- Less control over fulfilment and logistics processes
- Possibility of being cost-prohibitive for start-up organizations and small businesses

What Is 3PL?

Third-party logistics involves a manufacturer maintaining oversight of their supply chain but outsourcing transportation and logistics operations to a 3PL provider. This model is similar to 4PL in many ways, but 3PL providers focus on logistics such as inventory storage, inventory management, customs brokerage,

freight forwarding, contract management, picking and packing, cross docking, and IT solutions. Unlike a 4PL, 3PL providers will not oversee the entire supply chain and organization.

Advantages of 3PL

- Resource Network: A 3PL provider has a large resource network that provides advantages for in- house supply chains. They will manage all the logistics for a business from beginning to end. With their relationships and discounts, they can save you money on overhead and provide you with faster service.
- Save Time and Money: A 3PL provider will eliminate your need to invest in warehouse space, technology, transportation, and staff to execute the logistics process. They can also

manage billing, audits, training, staffing, and optimization.

- Scalability and Flexibility: 3PL providers can also scale space, transportation, and labour according to your inventory needs.

Disadvantages of 3PL

- Less inventory control
- Costly expense if customer orders are low
- Suitable for small-to-medium businesses, but not large ones
- Limited control over the customer experience and fulfilment

The Main Differences between 4PL and 3PL

The main difference between a 3PL provider and a 4PL provider is that a 4PL handles the entire supply chain, while a 3PL focuses on logistics. Each one provides its own advantages depending on your situation, so understanding what you get with each provider will help you make the right decisions for your company.

Fig: 3.6 Differences between 4PL and 3PL



Here are some of the key differences between the two options:

- 4PL providers are better for medium-to-large businesses, while 3PL providers are more suitable for small-to-medium businesses.
- 4PL providers function at the optimization and integration level while 3PL providers focus more on daily operations.

- 4PL providers may own assets like trucks and warehouses while 3PL providers generally don't typically own these assets.
- 4PL companies can effectively coordinate the activities of 3PL providers.
- 4PL providers provide the highest level of logistics services for a great value while 3PL providers are more focused on one-off transactions.
- 4PL providers maintain a single point of contact for every business' supply chain while with 3PL providers, businesses often need to manage certain aspects of the supply process internally.

3.9 Retailer-Supplier Partnership

Retailer-Supplier Partnership (RSP)

The RSP model allows a good and strategic connection between the supplier and the retailer, which provides an enhanced customer service channel. It ensures that the retailer and the supplier are on the same page and in accordance with the needs of the customers.

However, the vendors have to acquire important skills like forecasting, inventory control, and retail management for this partnership to be successful.

There are different models of retailer supplier partnerships. Some are listed below:

- **Quick response inventory (QRI) strategy**

In the quick response method, the retailer calls all the shots. The inventory ownership lies with the retailer.

Milliken and Company adopted this method. It was able to bring down the time of a full process of the supply chain from around 18 weeks to 3 weeks.

- **Continuous replenishment inventory (CRI) strategy**

In CRI, anyone can take charge of the inventory. A contractual and cohesive agreement would be there regarding the decision-making.

ding the decision-making.

The basic difference between all these models is that of the decision-maker and inventory owner. Vendors should be acquainted with proper training and skills. Advanced information systems, mutual trust, and top management commitment are some of the important pillars of a successful retailer- supplier partnership.

Pros and Cons of RSP with Respect to Supply Chain Management Benefits

- T
  he supplier entirely handles the logistics. So, there is less burden on retailers.
- T
  he system knowledge can be used effectively by everyone, thereby making the whole process productive. The manufacturers can use this information to produce items accordingly.
- V
  endors are relieved as there is less workload on the inventory. Hence, more focus on customer service.
- T
  here is a lot of room to coordinate reply replenishment to various other retailers. The whole supply chain management may become more cost-effective as well as less time-consuming.

But like a coin, it also has the other side. However, there is nothing that could not be solved.

Problems

- The issue of inventory ownership is always there.

Conclusion

- Confidentiality takes a big toll here. So, a lot of hesitation is there while sharing significant information.
- Lack of communication and cooperation may result in a big failure.
- The trust deficit between the partners can be a disaster.
- As the number of stakeholders increases, there might be a degradation of performance measures. Both parties can play the blame game on each other.
- Unnecessarily, the supplier has to take some of the responsibilities of the retailer— which can result in higher expenses for suppliers.
- Advanced information technology is required for the entire process, which makes it more expensive overall.

With the growing human needs and increasing level of customer service, supply chain management has to be very proactive. For that, we need to adopt more productive and effective technology and business models.

The loopholes need to be taken care of, and attention must be given to trust-building and behavioural management. If the model of retailer supplier partnership comes out successful and effective, it would really be handy in terms of the success of ecommerce logistics.

3.10 Supplier Evaluation And Selection

To succeed in today's competitive market, you need top-notch, affordably priced, and reliably sourced raw materials and services to produce the goods and services your business offers. Perhaps unsurprisingly, the first step to securing these goods and services lies in proper supplier selection and evaluation.

You know you need good suppliers—but they don't just appear in your supply chain like magic. In order to form strong, strategic, and proactive relationships with reliable suppliers, it's crucial to follow best practices and invest the time necessary to transform potential suppliers into trusted partners.

Why Supplier Selection and Evaluation Matters

In the distant past, supply chain optimization was often limited to a single factor: price. But thanks to increasingly sophisticated digital data management tools and the growing prevalence of digital transformation, the view of suppliers as mere vendors is giving way to a more nuanced one that regards them as potentially powerful partners in shared success. Today, vendors share data, integrate systems, and work closely with procurement specialists to help identify opportunities for product development and innovation, take advantage of cost-cutting measures, and engage in shared initiatives to expand market share or improve competitive advantage for both partners.

With proper supplier relationship management, your procurement team can put every potential supplier through a detailed and transparent evaluation process to determine Not every vendor

will become a key supplier or partner in creating a new product, of course. Nor will you forge a lasting, long-term relationship with every vendor in your supply chain. But with help from data-driven supply chain management and process optimization tools, deciding which suppliers meet your exacting standards for product quality, lead time, and relevance to your own core competencies is much easier to accomplish.

Making supplier relationship management the primary thrust of your overall supply chain management—and using the right tools to do so—makes it possible to use both qualitative and quantitative metrics to:

- Keep product quality levels high, lead times low, and suppliers' performance and compliance within acceptable parameters.
- Integrate important criteria such as sustainability and continuous improvement into your sourcing strategies and supply base.
- Plan ahead with contingency-based sourcing to insulate against business disruptions and preserve business continuity.
- Take corrective actions in a timely fashion to keep potential problems from snowballing into disasters, simplifying risk management.
- Avoid supply chain bloat while still allowing flexibility to quickly evaluate and add suppliers as needed.

In addition, establishing supplier evaluation criteria provides direct benefit to your business by strengthening your negotiation position. A supplier who has high marks in most areas but struggles in another may be amenable to better terms or pricing in order to secure your business. You can then leverage those savings to create a contingency plan in your supply chain to address the supplier's weakness (and eliminate any excessive risk created) and still come out with a net gain in profits, competitive advantage, etc.

How the Supplier Selection Process Works?

Building a reliable, flexible, and resilient supply chain requires an effective supplier selection process. Most selection methods rely on ranking each potential candidate using a scorecard.

When developing and implementing your supply chain optimization strategy, you'll likely use two different supplier evaluation and selection processes: one for existing vendors, and one for new suppliers. The former is generally used to secure positive changes in supplier relationships (better terms and service, discounts, a shift to a partnership role) or to "trim the fat" and eliminate or rehabilitate suppliers who have proven themselves unreliable, too costly, or simply a bad fit for your company's ethics and culture.

Both of these processes require you to have clear and documented standards for supplier performance and compliance.

They both follow the same simple three-step process:

1. **Potential Supplier Identification:** When choosing new suppliers, collect and record each potential candidate's score for your chosen criteria on their scorecard. The process is the same when reviewing existing suppliers, but includes additional evaluation criteria based on suppliers' record with your company.

   So, while a company building its supply chain will likely rely on reputation and referrals, a company streamlining its existing supply chain will have its own data for supplier compliance and performance to add to the mix when scoring candidates for retention,

revision, or removal.

2. **Supplier Evaluation**: Once you've identified your best candidates, it's time to score them using your chosen criteria. During this time, you can create a short list of favourites and then move them along in the process through negotiations. The process for optimising existing supply chains is, again, very similar. However, instead of a list of candidates to be added to the system, you may generate multiple lists of candidates you wish to elevate to a partnership role, negotiate with to secure better pricing or terms, or replace with other, more favourable options.
3. **Supplier Selection:** During the final supplier selection, you engage the winner(s) in contract negotiations to become a vendor in your supply chain. If you're evaluating your existing supply chain, this period will instead be used to modify, enhance, or terminate your relationships as circumstances and your needs dictate.

It's worth noting that, whichever approach you're taking, having a centralised, cloud-based data management solution such as PLANERGY at the heart of your procurement function makes it much easier to evaluate and select suppliers. With advanced process automation, analytics, and artificial intelligence, as well as complete and fully transparent integration with your existing software environment, you can collect, organise, and analyse the information you need to make smart and strategic sourcing decisions with confidence.

Traits to Look for in Potential Suppliers

Every company's approach to supply chain optimization and supplier relationship management will have its own unique elements. Different industries have different priorities and competitive paradigms, as

well as material needs. That said, the vendors regarded as "good suppliers" share a common set of traits you can look for when evaluating both your existing suppliers and any new ones you may be considering adding to the fold.

1. **Reliability:** Price used to be king of the vendor castle, but even the heftiest savings matter little if you can't get the raw materials and services you need, when you need them, or ensure the quality and total cost of your own products are up to snuff. Reliable suppliers ship the right items at the agreed terms for quality, price, and on-time delivery. They also have contingency plans in place to protect their own business continuity, reputation, and compliance; they're ready to get the job done, not pass the buck or excess risk to you.
2. **Stability**: New suppliers deserve their shot, of course, and there's room in most supply chains for non-critical goods and services to be filled by newcomers. But your key suppliers should be well-established, with a strong track record, a solid reputation, and ready referrals to accompany their pricing and terms.
3. **Location**: It's a global economy, to be sure, and companies can often secure substantial savings by outsourcing raw materials, goods, and even services from remote suppliers. However, the more miles between your business and its suppliers, the greater the risk for supply chain disruptions, delays, and unforeseen expenses. And if you need something critical on the double, you might find yourself paying a hefty premium to get it from distant suppliers—if you can get it at all.
4. **Core competencies**: You're competing in a world driven by data and digital

transformation, where time, accuracy, and insight are of the essence. If you find yourself waiting for your vendors to play catch up, you might find you're the one who's been left standing at the roadside of progress. Attractive suppliers have:

- Well-trained, knowledgeable staff prepared to work strategically with your procurement team to meet your specific needs and criteria.
- A clear understanding of the latest technologies, and the ability to connect their systems with yours to improve data collection, management, and analysis.
- High quality levels, attractive pricing (and financing, where relevant), and a proactive, positive attitude toward working with you as a client and potential partner in shared success.

5. **Price**: While cost savings and lowest possible price formerly dominated most supply chain and supplier relationship management models, that's no longer the case. Instead, companies are increasingly oriented toward centring procurement as a value centre for their organizations, prioritising both and-cost to do so. That said, price remains an important concern, and a useful area for negotiation. Just remember that it's the total cost of every purchase—along with potential savings and overall value created by positive relationships, overall supplier quality, and strategic decision making—and not just price that determines the return you're getting on your investment.

Additional Criteria: Ray Carter's 10 Cs of Supplier Evaluation

As you establish the most important criteria you'll be using during supplier selection and evaluation, it may prove useful to revisit Dr. Ray Carter's 10 Cs of Supplier Evaluation. Created in 1995 and published in the Journal of Purchasing and Supply Management by Dr. Ray Carter, the director of DPSS Consultants, these supplier selection criteria provide additional areas of consideration, including:

1. **Competency:** How well does the supplier meet its obligations and the expectations of its customers? What is its reputation with other businesses like yours?
2. **Capacity**: Can the supplier meet your company's requirements for quality, lead time, and price? What sort of materials management system do they have in place? Do they have the resources required to take corrective action when business disruptions strike?
3. **Commitment**: How does the supplier demonstrate its commitment to quality, performance, value, and overall excellence? Does it meet critical certifications and standards for its industry? Does the supplier have a reputation for going "above and beyond" to meet customer needs?
4. **Control**: What internal controls does the company use in their own policies, processes, and supply chain? How do they manage risk and quality assurance while ensuring they can meet customer expectations regardless of circumstances or exterior dependencies? Does the supplier comply with important regulations such as the International Standards for Organization's ISO9001, the General Data Protection Regulation(GDPR) in the EU, or the Sarbanes-Oxley Act in the United States?
5. **Cash**: What kind of cash flow profile does the supplier have? Do they have sufficient working capital to meet their needs and obligations while still holding enough in reserve for innovation, growth, and unexpected expenses? What evidence can they present to show a history of consistent financial health?

6. **Cost**: How does the supplier's pricing, and the total cost of doing business with them, compare to their competitors?
7. **Consistency**: Does the supplier have a strong track record for product quality and service? What procedures are in place to ensure this consistency? Are they willing to provide samples and/or demonstrations?
8. **Culture**: How well does the supplier's corporate culture mesh with yours? Do they share your company's workplace values?
9. **Clean**: Does the supplier match your standards for sustainability and environmental responsibility? Do they have a reputation as a "green" company? Are they committed to, and have a reputation for, ethical business practices?
10. **Communication**: Is the company open, transparent, and committed to both communication and collaboration? What plans does it have in place for communication during crises? Do their methodologies and technologies align with yours?

3.11 USE OF BEST PRACTICES AND INFORMATION TECHNOLOGY (IT) IN SUPPLY CHAIN MANAGEMENT

What is the role of IT in supply chain management?



Fig: 3.7 IT in supply chain management

The role that IT plays in supply chain management or SCM is so important. IT provides the tools which can pick up relevant information, break it down for proper analysis and execute it for optimum performance of the supply chain. Data is pivotal to the execution of the supply chain, primarily because it provides the base on which the supply chain managers can take decisions.

Real-time or almost real-time information is the key to proper supply chain management. With information about the various stages of the supply chain, decision-makers can plan, manage, and adjust processes to achieve goals in procurement, inventory, manufacturing, etc.

Why is technology important in supply chain management?

Business processes have been digitalised in the past couple of decades, and it has become a necessity rather than an option. Why not? IT integrates various operations carried out by

different companies in the supply chain. It speeds up the business processes and prevents bottlenecks. Companies are closer to achieving on-time procurement, shorter inventory, and better efficiency, especially in manufacturing. IT allows companies in the supply chain to meet the needs of consumers.

How does information technology affect supply chain management?

Supply chain management is all about producing the right product in the right quantity and sending them to the right place at the right time. It seems simple, but it can quickly become complicated.

How Suppliers Can Utilise Information Technology

The supply chain starts with the supplies. With a reliable supply chain software that allows real-time information sharing, manufacturers and suppliers can collaborate better and avoid production delays due to insufficient raw materials.

Normally, manufacturers initiate transactions with suppliers but if you are a supplier, you can monitor your clients' inventory, forecast future demands, and make sure that you're ready to fulfil orders for raw materials. Suppliers can also use historical data to make informed decisions in aspects like partnership and contract management.

Be the most reliable supplier in your area! Take advantage of the latest technology for supply chain management.

How Manufacturers Benefit from IT

IT offers better visibility and transparency that lead to better accountability and control over the production of goods. Manufacturers that have clear visibility on production can make adjustments to make the process more efficient as well as foresee problems and prevent them. For example, with IT, a manufacturer can foresee delays and make changes in the production schedule.

How Information Technology Helps Shippers

Timely delivery is essential in any industry. Delivery that's done on time usually results in customer satisfaction, and customer satisfaction normally leads to customer retention.

As a shipper or logistics provider, you can ensure customer satisfaction by improving order tracking and delivery. Keeping the manufacturers and distributors informed of the entire delivery process and possible delays already puts you a step closer to repeat business. What more if you can avoid delays by utilising data from the tools? Many supply chain management tools for delivery and shipping service providers also let you give clients access to a platform where they can enjoy a sense of control.

Utilise the best supply chain management tools to keep your clients satisfied.

How Distributors Can Take Advantage of IT

Distributors that are spending a lot of time and wasting money on inventory management can rely on supply chain management tools for some badly needed assistance. With the right tool and documented process, distributors no longer have to worry about excess or insufficient stock. Instead, they can predict demands and effectively manage inventory and orders.

How Retailers Can Use Information Technology

In the supply chain, retailers are the ones who face consumers. They need flexibility and visibility as well as integration. Retailers can integrate their POS systems, which capture their

sales, with their tool for monitoring the stock level, which is also visible to the distributor. Retailers can also set a reorder point that when reached will automatically generate an order.
Predict demands and manage orders effectively. Get the most reliable supply chain tools for sales and orders.

The Role of IT in Supply Chain Management

IT is leaving a mark everywhere. Nothing remains untouched. No wonder every aspect of a business is now under its command! The role of IT in Supply Chain Management is highlighted in the following points.

1. Integrated and Coordinated Supply Chain

A supply chain can only work efficiently when it is properly integrated and well-coordinated. IT performs this crucial task by bringing in multiple technologies and combining them to optimise the supply chain. These technologies make data collection possible and much easier and more accurate. In turn, this allows precise and detailed data analysis leading to sound business decisions.



Fig: 3.8 Coordinated Supply Chain

2. Increased Productivity

Smooth flow of information, new technologies and effective communication increase the productivity of all entities in the supply chain. It is like a trigger for product movement. Instead of going back and forth, IT provides the link that passes the needed information continuously.

3. Cost Reduction

IT permits optimum utilisation of resources and assets. Old data is used to study the trends, and technology is used to analyse it for improving performance. When resources are used optimally,

they result in cost reduction.

In a supply chain, the role of IT becomes more prominent because it motivates all parties to use their respective resources in the most cost-efficient manner. When IT is used as it should be, there is a dramatic fall in overall expenses.

4. Product Improvement

IT consists of tools and applications which can be used to gain early awareness. In a market where consumers always want something new, the product will either have to evolve or it will go out of demand. To stay in business, you must introduce product improvement and innovation sooner rather than later. The kind and extent of product improvement can be validated with the help of IT.

5. Supply Chain Visibility

Information makes the entire supply chain visible to supply chain managers. The manner in which the information flows from one collaborator to the other and the impact it has on others is used by the managers in making strategic decisions.

The Functional Roles of IT in Supply Chain Management

Apart from the above-mentioned basic roles, there are three functional roles of IT in supply chain management. These are:

1. Transaction Execution

When information flows efficiently between the participants of the supply chain, the number of transactions between them is reduced. IT increases the efficiency of repetitive data exchanges. This data is usually appropriate for delivery verification, order processing, billing, and dispatch advice.

2. Collaboration and Coordination

IT renders the flow of information. This makes for easier planning, coordination and improved collaboration between all participants. Demand forecasts make it possible to plan for the future, and order tracking makes knowing the physical location of each order a reality. Neither of these activities is possible without IT.

3. Decision Support

Good decisions cannot be pulled out of thin air. They are and should be based on data. IT is a huge benefit in decision support. It can collect even the most complicated set of data and convert it to easy- to-understand charts and reports. In this context, IT extends decision support to all managers.

Enjoy smooth transaction, efficient execution, and better collaboration whether you're on the upstream or downstream of the supply chain.

Software for Supply Chain Management

There are many tools that are used for effective supply chain management. These are primarily categorised as:

1. Enterprise Resource Planning

Materials requirement planning, which was earlier used to distribute resources for a manufacturing operation, resulted in enterprise resource planning (ERP), a system that links individual IT applications into a single one. This results in the integration of the data and the processes of the complete business. When all operations are consolidated, information related to cash flow and material flow starts making more sense. ERP has now become the backbone of the

supply chain and provides an integrated view of the organisation as a whole. Today, ERP has also led to the automation of many functions so that there is minimal human intervention.

2. Electronic Data Interchange

Electronic Data Interchange (EDI) is the exchange of business data from one computer to another. It is usually done in a standard format so that all concerned parties can use it according to their need without having to constantly ask for it. EDI allows companies, across the industry, to communicate with one another.

Everyone who uses EDI follows the same rules and methods. This makes for efficient inventory management, better business relationships, and improved customer service.

3. Supply Chain Management Systems

An ideal supply chain management system will help in planning, selecting the vendor, manufacturing, logistics, and building the customer relationship. To provide the necessary assistance Supply Chain Planning (SCP) software and Supply Chain Execution (SCE) software are used.

4. Customer Relationship Management

CRM or e-CRM uses IT to assist an e-business in managing its customer base. It matches customer needs with the product plans to increase sales.

The Final Word

The secret behind successful Supply Chain Management lies in IT. From the very beginning of the supply chain to its very end, data plays a key role in bringing the entire set together. IT tools provide the necessary communication link between all entities and allow them to work independently and yet in a coordinated manner. The role of IT in supply chain management is undeniable. It is the chain that binds everyone and everything together. It is vital!

3.12 Unit End QUESTIONS

A. Descriptive Questions Short Questions

1. What is third party logistics?
2. Define push based supply chain?
3. Write a short on inventory control in supply chain?
4. Write a short note on supply chain integration?
5. What are the obstacles of strategic alliances?

Long Answer Questions

1. Differentiate between push and pull based supply chain?
2. What is third and fourth party logistics?
3 What are the uses of Information technology (IT) in supply chain management?
4. What are Retailer and supplier partnership in supply chain management?
5. What is demand forecasting in supply chain management?

B. Multiple Choice Questions

1. Supply chain management control or link the production to.....

a. directing
b. distribution
c. finance

d. human resource

2. Moving goods from suppliers to the production unit is called as…….
    a. downstream
    b. upstream
    c. horizontal stream
    d. none of these
3. A warehouse manager have to keep the proper updates of the...
    a. stock
    b. finance
    c. marketing
    d. none of these
4. In the today's competition world every organisation want give proper service to the customers with the help of.....
    a. supply chain management
    b. retail management
    c. sales management
    d. none of these
5. Moving goods from suppliers to manufacturing company is part of of……..
    a. marketing
    b. production
    c. finance
    d. supply chain management

Answer:

1.b, 2.a, 3. a, 4.a, 5.d

3.13 References

- Bowersox, D. J., Class, D. J., Cooper, M. B., & Bowersox, J. C. (2013). Supply Chain Logistics Management (4th ed.). New York, NY: McGraw-Hill.
- Brealey, R. A., Myers, S. C., & Allen, F. (2017). Principles of Corporate Finance (12th ed.). New York, NY: McGraw-Hill.
- Chea, A. (2011). Activity-Based Costing System in the Service Sector: A Strategic Approach for Enhancing Managerial Decision Making and Competitiveness. International Journal of Business and Management, 6(11), 3–10.
- Cooper, R., & Kaplan, R. S. (1988). Measure Costs Right: Make the Right Decisions. Harvard Business Review, 66(5), 96–103.
- Coyle, J. C., Langley, C. J. Jr., Novak, R. A., & Gibson, B. J. (2017). Supply Chain Management: A Logistics Perspective (10th ed.). Boston, MA.

UNIT- 4 SUPPLY CHAIN PERFORMANCE

STRUCTURE

4.0 Objectives
4.1 Introduction
4.2 Bullwhip Effect and Reduction
4.3 Performance Measurement
4.4 Dimensions of Performance Measurement
4.5 Tools of Performance Measurement
4.6 SCOR Model
4.7 Demand Chain Management
4.8 Global Supply Chain
4.9 Challenges in Establishing Global Supply Chain
4.10 Factors That Influences Designing Global Supply Chain Network
4.11 Unit End Questions
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4.0 Objectives

After completing this Students will be able to

- Define Scor Model.
- Understand Global Supply Chain Management.
- Explain Factors Tag Influences In Designing Global Supply Chain
- Explain Performance Measurement.

4.1 Introduction to Supply Chain Performance

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 utilisation, 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 −

- Non-financial measures
- Financial measures

Non - Financials Measures

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

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 are as follows −

- S upply chain lead time
- O rder-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.

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

- **O rder 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 warehouse or a field warehouse or stock at any level in the system.
- **S tockouts rate** − It is the reverse of order fill rate and marks the portion of orders

lost because of a stockouts.

- **B**

  ackorder level − This is yet another measure, which is the gauge of total number of orders waiting to be filled.

- **P**

  robability 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, minimise stockout rate, and minimise backorder levels.

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. **Resource Utilisation**

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

- **M**

  anufacturing resources − Include the machines, material handlers, tools, etc.

- **S**

  torage resources − Comprise warehouses, automated storage and retrieval systems.

- **L**

  ogistics resources − Engage trucks, rail transport, air-cargo carriers, etc.

- **H**

  uman resources − Consist of labor, scientific and technical personnel.

- **F**

  inancial resources − Include working capital, stocks, etc.

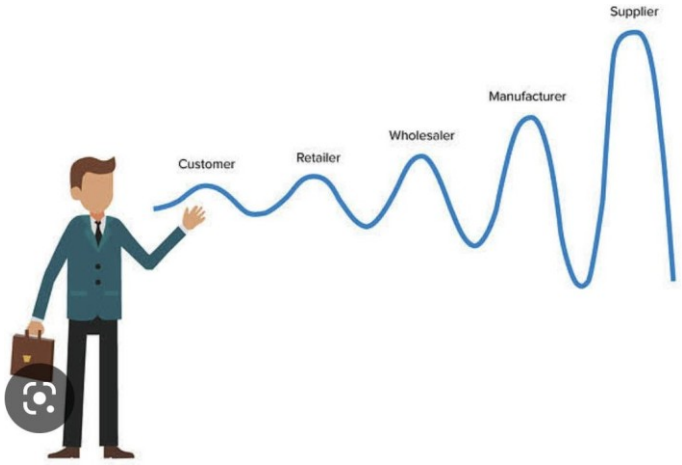
In the resource utilisation paradigm, the main motto is to utilise all the assets or resources efficiently in order to maximize customer service levels, reduce lead times and optimise inventory levels.

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 Bullwhip Effect And Reduction

The bullwhip effect is a supply chain phenomenon describing how small fluctuations in demand at the retail level can cause progressively larger fluctuations in demand at the wholesale, distributor, manufacturer and raw material supplier levels. The effect is named after the physics involved in cracking a whip. When the person holding the whip snaps their wrist, the relatively small movement causes the whip's wave patterns to increasingly amplify in a chain reaction.

In supply chain management, customers, suppliers, manufacturers and salespeople all have only partial understanding of demand and direct control over only part of the supply chain, but each influences the entire chain with their forecasting inaccuracies (ordering too much or too little). A change in any link along the supply chain can have a profound effect on the rest of the supply chain. Given that, there are many contributors and causes of the bullwhip effect in supply chain management.

Fig: 4.1 Effect and Reduction A simplified example of the bullwhip effect

The bullwhip effect often occurs when retailers become highly reactive to demand, and in turn, amplify

expectations around it, which causes a domino effect along the supply chain. Suppose, for

example, a
retailer typically keeps 100 six-packs of one soda brand in stock. If it normally sells 20 six-packs a day, it would order that replacement amount from the distributor. But one day, the retailer sells 70 six-packs and assumes customers will start buying more product, and responds by ordering 100 six-packs to meet this higher forecasted demand.
The distributor may then respond by ordering double, or 200 six-packs, from the manufacturer to ensure they do not run out. The manufacturer then produces 250 six-packs to be on the safe side. In the end, the increased demand has been amplified up the supply chain from to 100 six-packs at the customer level to 250 at the manufacturer.
This example is highly simplified but conveys the sense of exponentially increasing misalignment as actions and reactions continue up and down the chain. The bullwhip effect also occurs as a result of lowered demand at the customer level (which causes shortages when inaccurate) and can be caused at other places along the chain.

Causes of the bullwhip effect

Companies must forecast customer demand based on insufficient information, and try to predict how much product customers will actually want while accounting for the complex factors that enable that amount to be delivered correctly and on time. At every stage of the supply chain there are possible fluctuations and disruptions, which in turn influence the myriad supplier orders. Changes in customer demand directly influence all the other factors along the chain, including inventory. However, the bullwhip effect can occur even in relatively stable markets where the demand is essentially constant. Forecasting demand has always been a difficult endeavour, and the increasing complexity of today's global supply chains intensifies that difficulty, as does increasing consumer preference for Omni channel and e-commerce. A few of the most common dependencies that can cause a bullwhip effect are:

- Lead-time issues such as manufacturing delays
- Less-than-optimal decisions made by supply chain stakeholders at any point along the chain, for example, customer service or shipping
- A lack of communication and alignment between each link or stakeholder organization in the supply chain
- Over- or under-reacting to demand expectations, such as ordering too many units or not enough
- Customer companies, often retailers, waiting until orders build up before placing orders with their suppliers, a practice called order batching
- Discounts, cost changes and other price variations that disrupt regular buying patterns
- Inaccurate forecasts from over-reliance on historical demand to predict future demand

Impact on supply chain management

The bullwhip effect can be costly to all the organizations in the supply chain. Excess inventory can result in waste, while insufficient inventory can lead to reduced lead time, poor customer experience and lost business.

Most businesses use safety stock (reserve inventory) as a buffer against demand fluctuations. However, safety stock is not a solution to the bullwhip effect, but it provides enough product to fill orders until more arrives from suppliers.

Some solutions to the bullwhip effect

Better information is necessary to reduce the bullwhip effect. This means better communication among supply chain partners and better forecasting methods. Some commonly recommended actions include the following:

Foster supply chain communication and collaboration.

Better alignment around supply chain issues both within the company and among customers, suppliers, distributors, manufacturing and the rest of the partners is needed. In particular, when suppliers work to understand customer needs, they can work to help reduce excessive inventory. Supplier and project portals, Electronic Data Interchange (EDI) transactions and other capabilities of supply chain management software can help.

Use better forecasting and visibility tools.

A wide range of software helps enable more accurate demand forecasts and visibility into what is happening along the supply chain. These include demand sensing software, forecasting software, inventory optimization software and tools that use analytics (especially predictive analytics), artificial intelligence (AI) and Internet of Things (IoT) connectivity.

Explore a demand-driven approach to supply chain management.

A demand-driven approach relies on a system of coordinated technologies and processes to gain insight into supply chain occurrences and react to them quickly. It uses many of the approaches mentioned above, especially collaboration and communication and new technologies to enable supply chain visibility, for a coordinated holistic approach. Each company will need to decide on the right push-pull approach to its strategy, where a push approach is used for stable products and a pull approach is used for those with more erratic demand.

How Do You minimise the bullwhip effect?

Every industry has its own unique supply chain, inventory placements, and complexities. However, after analysing 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 stock out situations and missed customer orders can be achieved. Below are some of the methods to minimize the bullwhip effect.

1. 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 analyse 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. Optimise 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.

4.3 Performance Measurement

Performance measurement is the process used to assess the efficiency and effectiveness of projects, programs and initiatives. It is a systematic approach to collecting, analysing 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. Note that 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.

Benefits of performance measures

The benefits of measuring performance are numerous and range from measuring the effectiveness of a single project to contributing to a culture of continuous improvement throughout an organization.

Using performance measures on a regular basis helps to inform decisions and means a plan can be adjusted mid-course or priorities can be reset to take advantage of emerging opportunities. An internal performance measurement system will drive results and enable an organization to learn from its successes and failures.

Other benefits of performance measures include:

- Creates "buy-in" through stakeholders setting targets and goals together.
- Develops "best practices" and "lessons learned" that can be applied to future initiatives.
- Increases accountability by demonstrating the effectiveness and value of plans and activities in achieving desired goals/outcomes.
- Informs decision-making including budgeting and resource allocation in an environment where there may be competition over limited resources.
- Helps to demonstrate and document changes over time.
- Helps to communicate an organization's story.
- Develops relationships through engaging stakeholders and building a common understanding of the process.

What is a performance measurement framework?

A performance measurement framework identifies the indicators required to monitor and gauge the performance of a program. Its purpose is to:

- identify measures
- methodology for connection and analysis
- roles and responsibilities
- reporting by using a logic model

A performance measurement framework supports program managers in:

- continuously monitoring and assessing the results of programs as well as the efficiency of their management
- making informed decisions and taking appropriate, timely action with respect to programs
- providing effective and relevant departmental reporting on programs
- ensuring that the information gathered will effectively support an evaluation There is no one method for developing a performance measurement framework.

One place to start is to review the organization's strategic plan, with a focus on identifying its outcomes (what it is trying to accomplish.)

If there is no strategic plan, a framework can be developed for an individual project.

4.4 Dimensions Of Performance Management

They provide a great way to look at the top 10 critical dimensions of almost every job and provide a great framework to guide and develop people in their roles.

These include:

1. Quantity of work i.e. the quantity or amount of work produced or the sheer volume of work completed by employees – recognises hard-working employees
2. Timeliness of work i.e. timely delivery of work in terms of schedules, meeting deadlines, etc. – recognises employees who produce work on-time and meet deadlines

3. Quality of work i.e. the quality of work produced in terms of standards, errors, waste and rework – recognises employees who produce quality work, work which meets standards and work with few errors or mistakes
4. Use of Resources/Efficiency i.e. Produces work in an efficient way in terms of using time, money, materials and other people's time well – recognises employees who come in on budget with efficient use of time, materials and people
5. Customer (External & Internal) Impact/Value Add i.e. work produced meets the expectations of customers (external or internal) – recognises employees who do work that meets/exceeds internal or external customer standards and expectations
6. Self-Reliance i.e. recognises employees who produce work without the need for extensive supervision – requires a reasonable level of support
7. Department Contribution – the employee is helpful to others in the department in getting work done and sets a tone of co-operation
8. Productive Work Habits – the employee has an overall work style which is effective and productive in terms of time management, setting priorities and following-up on commitments
9. Adding Skills & Capabilities – the employee is continuously adding new capabilities in terms of skills, knowledge, and attitude to get work done in new/better ways and building for the future
10. Alignment & Compliance – the employee behaves in a way that is aligned with the values, culture and mission of the organisation as well as common organisational practices and procedures.

4.5 Tools Of Performance Management



Fig: 4.2 Performance Management

1. Employers measure employee job performance through a variety of tools and processes. Some use more than one, but smaller businesses often choose one tool that works best for them and use it consistently. These systems of measurement, called performance appraisals, must come across as fair and just for employees to consider them credible. Those implementing these tools should choose tools that offer the highest level of objectivity possible. Of course, removing all or most subjectivity is difficult, but some tools lend themselves to objectivity better than others.

360 Degree Feedback

1. With 360-degree feedback performance appraisals, managers receive anonymous feedback from individuals with whom they interact frequently in the course of daily operations. These can include internal and external customers, superiors, direct reports, subordinates, vendors and sales people. A human resources representative or outside consultant trains evaluators in the proper interpretation of multiple-choice survey questions and written responses. Evaluators are chosen at random from the above groups to avoid skewed results. Managers often trust the responses from 360 feedback appraisals because of their confidential nature. This makes the responders feel free to give honest answers without fear of retribution.

Balanced Scorecard

2. This approach combines quantifiable information, such as sales quotas and budgetary requirements, with performance standards particular to the position. It utilises key performance indicators, or KPIs, to track how well the employee has reached short- and long-term goals. These take into account the

employee's career growth and adherence to best practices as set forth by the individual organization. The balanced scorecard approach to performance measurement is most often utilised at the highest echelon of business, but middle management might use it as well.

Management by Objective

3. With this method, managers meet with direct reports and, together, come up with short- and long-

term goals for the year that are in line with the company's key objectives and business mission. At year- end, the managers measure their employees' achievements against these goals. Peter Drucker coined the term, "management by objective," in the 1950s when the business world worked quite differently than today. He suggested inflexible, static goals and objectives for the employees, but in today's high- tech world, fluid and dynamic goals work best. By allowing for periodic tweaking of the original goals, many companies can still effectively utilise this model for performance measurement.

Self-Evaluation

4. Self-evaluation tools allow the employee to rate himself against the same or similar criteria used by his supervisor. Often this involves qualitative and quantitative criteria. This method can raise the

credibility level of the process in the view of the employee; especially when the employee's self- assessment score lines up closely with that of the supervisor. When the scores are somewhat at odds with one another, this tool offers discussion processes whereby these differences can be discussed in a safe, constructive manner.

4.6 Scor Model

Supply Chain Operations Reference (SCOR) is the Supply Chain Council (SCC) official standard for supply chain management diagnostics.

SCOR is broken down into three major segments: process modeling, performance measurements and supply chain best practices. Process modelling breaks down further into five management processes: planning supply chain operations; sourcing goods or services; making or manufacturing products;
delivering finished goods; and handling product returns. Under the performance measurements segment, SCOR draws from more than 150 SCC-approved key performance indicators for measuring the success of a supply chain operation. For the supply chain best practices segment, SCOR requires practices meet four requirements: they are current, or not emerging or old-fashioned; they are structured, with clearly stated goals and procedures; they are proven, with success demonstrated in real-world environments; and they are repeatable, or have worked in more than one environment.

The supply chain operations reference (SCOR) model is designed to evaluate your supply chain for effectiveness and efficiency of sales and operational planning (S&OP). SCM is complex, and S&OP implementation can be difficult, but the SCOR model is intended to help standardise the process and create a measurable way to track results. It works across industries using common definitions that apply to any supply chain process. Using the SCOR model, businesses can judge how advanced or mature a supply chain process is and how well it aligns with business goals.

The SCOR process can go into many levels of process detail to help a company analyze its supply chain. It gives companies an idea of how advanced its supply chain is. The process helps companies understand how the 5 steps repeat over and over again between suppliers, the company, and customers. Each step is a link in the supply chain that is critical in getting a product successfully along each level. The SCOR model has proven to benefit companies that use it to identify supply chain problems. The model enables full leverage of capital investment, creation of a supply chain road map, alignment of business functions, and an average of two to six times return on investment.

How to use the SCOR Model to structure and develop supply chain processes (without becoming a member)?

To get full access to the model you have to become a paying member (for bigger companies it offers a number of useful services such as benchmarks etc.). But you can use the (free available) resources of the SCOR Model for mapping and developing your supply chain processes without becoming a member. An easy-to-use-approach are the following four steps. I will explain them in the remainder of the contribution after having presented a short case of a fictive online-shop:

1. Map the relevant supply chain processes with the SCOR model
2. Define success factors depending on your business model
3. Derive the most important KPIs to measure the supply chain success
4. Establish a technology roadmap.

The following paragraphs apply the suggested approach for mapping and developing supply

chain processes based on the SCOR Model.

1. Mapping relevant supply chain processes

Based on the quick reference guide relevant process categories can be selected. These categories are also shortly described of the case. The following graph gives an overview of the relevant process categories for our online-shop.

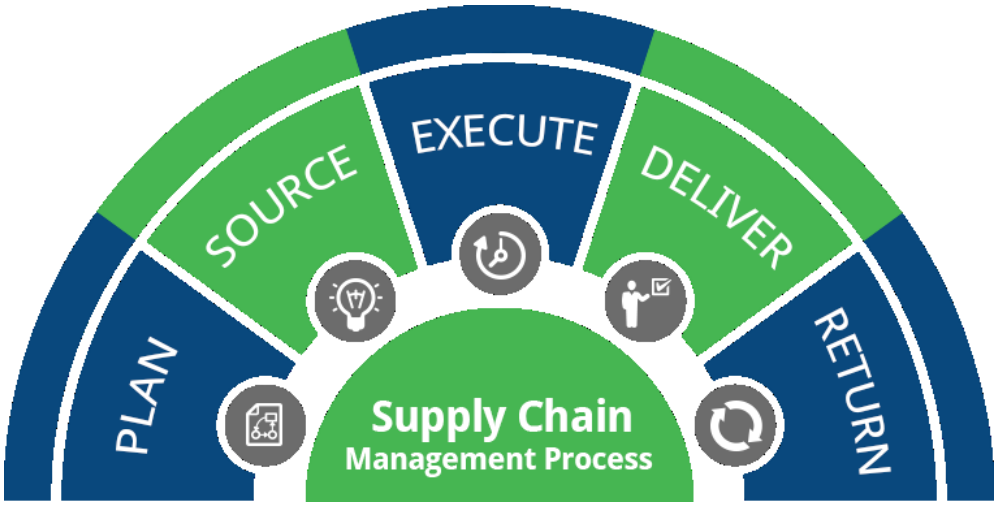


Fig: 4.5 Supply Chain Management Process

Plan

Even though especially for smaller companies a formal planning process is often lacking, it does make sense to think about some supply chain aspects beforehand:

Plan Supply Chain: this process is about planning and matching the general requirements of the business model towards the supply chain with the necessary resources. A question for our online shop could be wether the fulfilment is organised in a self-owned warehouse or if this is outsourced to a service provider.

Plan Source: Here the planning of the offered product range and the necessary suppliers have to be planned. The location of the suppliers has strong influence on lead times and lot sizes and thus stock levels and necessary warehouse capacities.

Plan Deliver: within this activity sales channels such as the own website, eBay or other marketplaces have to be selected as well as the carriers or packaging materials. Also interesting for the deliver process are public events that influence demand peaks or at least fluctuations.

Plan Return: A major share of the delivered products are returned by the customers. Therefore, the return procedures have to be planned. Such as: when does it make sense to rework and not scrap the returned products and how is this done. Associated with that question are the necessary resources for the return process. The return of defected products to the suppliers is also relevant as it could be a big cost factor.

Source

For the sourcing processes two main categories could be identified:

Source Stocked Product: basics und accessories are sourced from suppliers or distributors based on catalogues. Usually lead times are shorter and allow flexible sourcing and shorter

reaction times.
Source make-to-order product: One of the main USPs of the shop is that it offers branded local carnival clothes. Those clothes are made to order by suppliers in Asia based on provided designs. Lead times as well as lot sizes are usually larger.

Deliver

In the Deliver category the only process category is the Deliver Stocked Product process. All the products are stocked in a self-owned small warehouse. The orders are verified, the products picked and packed and buffered for the CEP-carriers to be picked up and delivered to the customers.

Return

As usually around 30-40% of the products are returned, effective return processes are important for the success of our online shop. Both return processes – from customers and to suppliers – must be looked at:
Source Return Defective Product: When defective or simply the wrong products are found in the incoming goods inspection they have to be returned to the suppliers. Also new ones have to be ordered and possibly the payments have to be stopped or reimbursed. It is also possible that suppliers do not accept complaints or returns. In this case the dispute has to be settled.
Deliver Return Product: Reasons for customers to return ordered products are numerous: wrong product, wrong size, different look and feel as expected, the wish to have a choice or simply also defective products. In the return case the products have to be received and inspected. The next step is to decide if the products are scrapped or reworked and put into the inventory again.

Enable

In the enable category processes could be found that support or provide the infrastructure for the planning and execution processes. For our online shop two enable processes seem to be very relevant: Manage Supply Chain Performance: the performance in the supply chain processes is relevant for both the customer and the financial success of the company. Therefore, the performance has to be tracked and the right KPIs have to chose.
Manage Supply Chain Technology: especially online businesses need a sound technological basis: from
a Web shop, APIs to easily integrate processes to other marketplaces or payment service providers, over ERP or WMS to support for picking, packing, labelling and management of the returns.

2. Defining success factors for your business

We can assume that the online shop is on the market for quite some time and has a sound customer basis and a good reputation on the market. Along with this a moderately rising turnover with its branded products guarantees a positive outlook. So, it is not anymore a start-up. We could assume the following success factors:
Attractive branded products that are complemented with a range of basic accessories: customers order because they know that the shop offers some unique products for local carnivals with a good quality.
Competitors offer only cheaper products that are less authentic

Accurate and fast deliveries along with a customer friendly redemption policy: because of the high quality customers expect a quick treatment of their orders with few errors.
The good development entails ideas for new product segments and a rising volume. Therefore, the complexity of the processes has to be kept on a moderate level and the efficiency must be closely looked at.

3. Deriving the most important KPIs

Based on the success factors the relevant metrics to measure the performance of the supply chain can be derived. Starting with an efficient availability of the products in the sourcing process, the customers must be served swiftly and cheaply in the deliver process and the high return rates must be monitored in order to not undermine the economic success.

Source

The basis to be able to sell products and for a good service level towards the customers is the reliable availability of the products for which the sourcing process is responsible. Therefore the reactivity in the sourcing process must be measured. The most important metric to measure the responsiveness (here in the sourcing process) is the Order Fulfilment Cycle Time. It measures the time from the placement of the order until the good are being received. It can consist of several components such as source cycle time (e. g. the administrative processes to place the order) or if it is a make-to-order product the make cycle time. This must be taken into account when evaluating and comparing the times for different products from different suppliers.

Deliver

For the deliver process both aspects must be tracked: a swift and accurate delivery and an efficient process that consumes as few resources as possible. Therefore, the Perfect Order and the cycle times of picking and packing the products should be measured.
The Perfect Order measures if the orders are delivered on time and in full. A detailed description of their important metric that measures the delivery reliability can be found (in German) here. In a nutshell it is calculated by dividing the orders that were delivered on time and in full by the total number of orders. For the delivery of make-to-stock products that just have to be picked from the shelves a value of 95- 99% is realistic depending on the products, the order structure and the picking technology.
The metrics Pick Product Cycle Time and Pack Product Cycle Time measure the average time it takes to pick one order line and pack one order. As both processes are often manually, especially for a smaller online-shop, the most costly factor are the people that pick and pack. So the time in this case correlates to a high degree with the cost of picking and packing. And at the same time this metric can be used for the estimation of the staff that is needed to fulfil the incoming orders (on a daily basis but also for peak times such as the carnival season.

Return

In the return process categories both the return deliver and the return source must be covered with metrics. As already mentioned the Return Deliver process accounts for a major share of all activities in the online-shop and must be therefore carefully tracked. An increase of 10% in the returns (which account for around 40% of all deliveries) because of not well explained new products on the website or blurring in the sizes can highly influence the necessary

fulfilment capacity needed. Therefore, the Return Rate that is calculated by dividing the returned order lines by all order lines is an important metric.
In the Return Source category, the Cost to Return is the metric that is used to measure the cost (including personnel and shipping fees as well as fees concerning payment or disputes) is the metric that can measure how much money is lost on poor supplier performance.

4. Establishing a technology roadmap

Based on the mapped processes, the success factors and the defined metrics, the most important fields of action concerning technological support can be identified. Besides a good IT-System landscape that offers a strongly integrated workflow from the purchase order till the return handling a technology support in the warehouse for the picking and packing seem to be the most important areas of development for our online-shop. Another field of action could be an integrated track-and-trace-system to inform customers as well as the shop itself about the status of the delivery. Here an overview of available technologies for supply chain processes can be found here (in German).

4.7 Demand Chain Management

Demand-chain management (DCM) 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 study of the university in Wageningen (the Netherlands) sees DCM as an extension of supply chain management, due to its incorporation of the market-orientation perspective on its concept.

A Demand-driven supply network (DDSN) 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 customer‟s 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. Customers demand is hard to detect because out of stock situations (OOS) falsify data collected from POS-Terminals. According to studies of Carsten/Green (2002, 2008) the OOS-rate is about 8%. For products under sales promotion OOS rates up to 30% exist. Reliable information about demand is necessary for DCM therefore lowering OOS is a main factor for successful DCM.

Corsten and Gruen describe key factors for lowering OOS-rates:

- Data accuracy
- Forecast and order accuracy
- Order quantity
- Replenishment
- Capacity (time supply)
- Capacity (Pack out) and Planogram Compliance
- Shelf Replenishment

4.8 Global Supply Chain

Firms are creating truly global supply chains because it enables them to reduce their costs.

Companies can take advantage of lower production costs and they can outsource to free capital from non-core activities and generate large-scale efficiencies. In addition, the costs of shipping, communications and tariff-related charges have come down over the years.

Global supply chain management involves planning how the entire supply chain will function as an integrated whole, with the aim of generating an optimum level of customer service while being as cost efficient as possible. Other aims include increasing the speed your product reaches your customers, as well as flexibility in dealing with customer transactions. It incorporates management processes that integrate the network of suppliers, manufacturers, warehouses and retail outlets. This ensures the right type of goods are sourced, supplied, produced and shipped. These processes also help guarantee shipments are in the right quantities, locations, arrive on time and are in sound condition. To achieve successful integration, flows of information, materials and finances through the supply chain must be co-ordinated effectively.

What are the three things all successful supply chain management needs?

Supply chain management touches all of an organization's functions. To be successful, it requires focused effort across the entire company and collaboration with all outside suppliers and service providers. This means that supply chain management must have a multidimensional approach, involving people, processes and technology.

People

People are key to supply chain management because they are the core of organizations. For successful supply chain management, the people involved must have the skills and knowledge to manage sourcing, manufacturing, storage and transportation of products. They must have a solid view of the company's strategic business vision and know how their role fits into the overall functioning of the supply chain.

Processes

The processes in supply chain management are the actions taken with the aim of satisfying customers. They include all functions involved in the supply chain: sourcing, distribution, transportation, warehousing, sales and customer service. They also include all actions performed by external companies that are part of the supply chain.

Technology

Technology is used in the supply chain to connect people and processes. However, people involved in the supply chain will not use technology unless they find it easy to adopt. Careful selection and implementation of the supply chain technologies a company uses is essential for supply chain success. **The benefits of global supply chain management**

In the modern global marketplace, advances in communications and transportation technologies have led customers to expect a steady and regular supply of products in good condition at the lowest possible price, despite the long distances most products, commodities and foodstuffs are shipped. Companies must always be looking for ways to improve the functioning of their supply chains to ensure that their supply meets projected demands cost effectively. By not producing sufficient product to meet demands, they will lose customers. If they produce too much product, they must pay for expensive warehousing for excess inventory, which they might not be able to sell. Companies might be faced with mass product recalls or returns if supplies are not sourced carefully and productions is not

monitored. These can result in financial ruin for a company

The cost savings provided by supply chain management enhance additional cost-cutting manufacturing methods and strategies that many international companies have already instituted.

These strategies include the following:

- Just-in-time (JIT) manufacturing (reducing inventory levels, overall costs, product variability and production times, and also improving product quality)
- Lean manufacturing (producing goods using less manpower, raw materials, time and space)
- Total quality management (embedding awareness of quality in all operational strategies)

Global supply chain management has many benefits for a company. It enables business processes to be organised using international organizations that be reduced, companies can react rapidly to unforeseen market conditions, transport strategies can be improved, costs can be minimised and waste can be eliminated. You can get your product to market substantially more quickly. Small- and medium-sized businesses benefit as well. These smaller organizations, especially with niche technologies or specialisations, can now sell to multinational organizations or to their suppliers. Many large firms have started outsourcing activities previously done internally.

4.9 Challenges In Establishing Global Supply Chain

The challenges that companies face in globalised supply chains

Finding low prices to source or manufacture goods in Asia has never been an issue. The problems usually arise at a later stage. To make a global supply chain worthwhile, these issues need to be appropriately managed to ensure a good supply chain. To address those challenges, businesses need to identify them and then think of how to deal with them strategically.

Here are the top challenges that businesses have to face in global supply chains in 2021:

1. Black swan events

A black swan event is an adverse event that is almost impossible to predict and prepare for it. Businesses understood very well the consequences of a black swan event in 2020 with the COVID-19 pandemic. The whole world depends on China for manufacturing and transporting goods around the globe. But the fact that China shut down many of its production lines as a safety measure harmed global trade for months.

As the world is almost back to normal in 2021, the big bet for businesses is to avoid future black swan events. To achieve that, they need to regionalise and source their goods and materials from places closer to their home country to stop their over dependence on Asia.

2. Material Scarcity

This pandemic was characterised by a sharp increase in consumer demand like never before. Inputs was a concern even before the pandemic began, and things got only worse. Many companies and still suppliers are struggling to keep up with the existing demand. At the same time, there is a shortage of various kinds of parts and materials in global supply chains.

3. High freight prices

With a skyrocketing consumer demand and many orders left behind due to the pandemic, the demand for shipping has exceeded the industry's capacity. As expected, with limited supply and high

demand, freight prices are constantly rising. This creates more headaches for businesses as they need to consider higher transportation costs that further reduce their profit margins.

4. Port congestion

Port congestion means that freight ships in global supply chains arrive at their destinations, but they have to wait until they unload their cargo. While the demand for goods is still high, port capacity remains fixed on top of delays due to pandemic safety measures. Now, ships need to queue up and wait for a longer time than usual. A recent example of port congestion in 2021 was due to Ever Given being stuck in the Suez Canal for six days. As a result, there was a traffic jam of over 200 vessels waiting to pass through the Canal and reach their final destinations.

5. Difficulty in forecasting demand

During the pandemic, we all witnessed empty shelves at supermarkets due to people panic buying home goods. But at the same time, others languished on shelves. The pandemic made demand forecasting extremely difficult, and they don't have a guide on how much to stock or manufacture at any given time. The previous demand forecasting models are almost useless in times like these, and businesses now work more on gut instinct.

6. Lead times

Buyers increasingly expect faster deliveries.

"The effect of Amazon is heightened expectations," says C. John Langley, a clinical professor of supply chain management. "Next week is no longer good enough. It's got to be on its way now and arrive at its destination within a day or two."

However, global supply chains often measure shipping times in weeks and months. These long lead times make it challenging to balance supply and demand effectively.

Effective planning is the solution.

Although air freight is more expensive than ocean freight, it's a lot faster. Consider using land or ocean freight day-to-day, but having air freight agreements in place that you can use quickly to capitalise on sudden increases in demand.

You could also follow Amazon's lead and set up a small network of warehouses close to your target market's locations to store inventory so you can deliver to buyers faster.

7. Delays

Unfortunately, long lead times can expose your shipments to even longer delays. With so many steps in the global supply chain and such large distances for goods to travel, there's many opportunities for things to go wrong.

As a result, it's crucial to have firm completion dates and shipping times. It's also vital to have agreements in place with your partners that outline what happens when things don't go according to plan.

8. Cash flow

Cash flow management is a serious issue in every business, but it's a particularly complicated task in global logistics and supply chain management.

Businesses must keep track and plan for a complex web of expenses. But with so many entities operating simultaneously, it's hard to know where and when to allocate your resources.

For example, if you spend £10,000 on materials, you need to know how much it will cost to turn them into products and get them into customers' hands. This process might include shipping, storage, manufacturing, packaging, freight forwarding, distribution, marketing, sales, and more.

Again, plan ahead. Create a detailed calendar of future expenses and take measures to ensure you'll be able to for them when the time comes.

9. Data management

By now, you may have realised that there are so many data points to take into account, data management itself is an issue.

"Organisations can quickly become overwhelmed by the vast amount of data today's enterprise

systems, connected devices and social networks create," said Allan Dow, president of the leading AI- based supply chain planning solution Logicality.

This is why a survey by Legality and APICS, the association for supply chain management, found that:

- 36% of respondents see the opportunity to balance supply and demand as a top driver for their analytics initiative.
- 19% of companies want to leverage machine learning to improve their business's forecast accuracy.

In short, to manage the global supply chain effectively, businesses must use and customise a suitable data management solution.

10. Exposure to risk

Many countries providing relatively inexpensive labour and manufacturing costs also typically have less stable governments and currencies. Local changes in leadership and policy can often affect the global supply chain.

What's more, global supply chains are exposed to risks that local supply chains aren't, such as international policy changes, for example, Brexit.

Companies have very little control over these factors, so it's best to 'hope for the best and prepare for the worst.'

Set up prospective agreements with suppliers, manufacturers, and freight forwarders in another region or country to fall back on. You may also want to secure appropriate insurance policies to cushion potential blows.

11. Accountability and compliance

Companies have to consider social compliance when doing business internationally. Unfortunately, modern slavery, child labour practices, unacceptable working conditions and unfair compensation are just some of the unethical practices present in global supply chains.

As time goes on, there are more and more ways to verify supply chain partners to ensure ethical standards are followed. However, there's often no way to be certain that everything is above board. Companies must manage the risks associated with these issues: potential brand damage, legal action, and most importantly, the irreparable harm caused to individuals

in exchange for profit.
Signing up to schemes such as the Certified B Corporation and Amfori's Business Social Compliance Initiative (BSCI) is a great way to handle these risks.

12. Quality control and defects

Quality issues can also be challenging to manage. For example, businesses must consider the differences in acceptable defect levels in different countries.
It's essential to clarify the quality level expected and the percentage of acceptable defects ahead of
time. It's also best to define who is responsible and what happens should there be a disagreement in the future.

13. Language barriers

Another drawback to consider is that many countries will conduct day-to-day operations in a different language.
You can manage these types of issues by employing professional interpreters with specialist industry knowledge. Plus, it's always worth clarifying expectations and responsibilities in writing.

14. Time zones

Times zones can also make communication difficult. For example, the time difference between the centre of America and central China is a whopping 15 hours.
When there's no overlap in working hours, you can't just pick up the phone.
Instead, communication often happens via email and messaging platforms. In this situation, you'll usually have to wait until the next day to receive an answer. This can make it very challenging to oversee technical aspects of the production process.
For this reason, many companies set up small outposts of company representatives to manage things locally in each region of the global supply chain.

15. Exchange rate and foreign transaction costs

Exchange rate fluctuations matter little when taking a holiday abroad. However, even the smallest changes in foreign exchange rates can increase costs significantly when managing a global supply chain. Developing countries may offer the cheapest labour rates globally, but they often have relatively unstable currencies that are susceptible to regional influences.
Another consideration is the high cost of international transactions when using a bank. These fees can quickly add up and hurt your margins.
Try to make large purchases when your domestic currency is strong and avoid hefty international banking fees with an innovative global payment provider.
For example, a Neat Account lets you make and receive payments in multiple currencies online. Plus, you can make cost-effective local and international transfers to over 35 countries.

4.10 Factors that influences designing Global Supply Chain Network

1. Strategic Factors

A firm's competitive strategy has a significant impact on network design decisions within the supply chain. Firms that focus on cost leadership tend to find the lowest cost location for their manufacturing facilities, even if that means locating far from the markets they serve.

Electronic manufacturing service providers such as Foxconn and Flextronics have been successful in providing low-cost electronics assembly by locating their factories in low-cost countries such as China. In contrast, firms that focus on responsiveness tend to locate facilities closer to the market and may select a high-cost location if this choice allows the firm to react quickly to changing market needs. Zara, the Spanish apparel manufacturer, has a large fraction of its production capacity in Portugal and Spain despite the higher cost there. The local capacity allows the company to respond quickly to changing fashion trends. This responsiveness has allowed Zara to become one of the largest apparel retailers in the world.
Convenience store chains aim to provide easy access to customers as part of their competitive strategy.
Convenience store networks thus include many stores that cover an area, with each store being
relatively small. In contrast, discount stores such as Sam's Club or Costco use a competitive strategy that focuses on providing low prices. Thus, their networks have large stores, and customers often have to travel many miles to get to one. The geographic area covered by one Sam's Club store may include dozens of convenience stores.
Global supply chain networks can best support their strategic objectives with facilities in different countries playing different roles. For example, Zara has production facilities in Europe as well as Asia. Its production facilities in Asia focus on low cost and produce primarily standardised, low-value products that sell in large amounts. The European facilities focus on being responsive and produce primarily trendy designs whose demand is unpredictable. This combination of facilities allows Zara to produce a wide variety of products in the most profitable manner.

2. Technological Factors

Characteristics of available production technologies have a significant impact on network design decisions. If production technology displays significant economies of scale, a few high-capacity locations are most effective. This is the case in the manufacture of computer chips, for which factories require a large investment and the output is relatively inexpensive to transport. As a result, most semiconductor companies build a few high-capacity facilities.
In contrast, if facilities have lower fixed costs, many local facilities are preferred because this helps lower transportation costs. For example, bottling plants for Coca-Cola do not have a high fixed cost. To reduce transportation costs, Coca-Cola sets up many bottling plants all over the world, each serving its local market.

3. Macroeconomic Factors

Macroeconomic factors include taxes, tariffs, exchange rates, and shipping costs that are not internal to an individual firm. As global trade has increased, macroeconomic factors have had a significant influence on the success or failure of supply chain networks. Thus, it is imperative that firms take these factors into account when making network design decisions.
Tariffs and Tax Incentives Tariffs refer to any duties that must be paid when products and/or equipment are moved across international, state, or city boundaries. Tariffs have a strong influence on location decisions within a supply chain. If a country has high tariffs, companies either do not serve the local market or set up manufacturing plants within the country to save on duties. High tariffs lead to more production locations within a supply

chain network, with each location having a lower allocated capacity. As tariffs have decreased with the World Trade Organization and regional agreements such as the North American Free Trade Agreement (NAFTA), the European Union, and Mercosur (South America), global firms have consolidated their global production and distribution facilities.

Tax incentives are a reduction in tariffs or taxes that countries, states, and cities often provide to encourage firms to locate their facilities in specific areas. Many countries vary incentives from city to city to encourage investments in areas with lower economic development. Such incentives are often a key factor in the final location decision for many plants. BMW, for instance, built its U.S. factory in Spartanburg, South Carolina, mainly because of the tax incentives offered by that state. developing countries often create free trade zones in which duties and tariffs are relaxed as long as production is used primarily for export. This creates a strong incentive for global firms to set up plants in these countries to be able to exploit their low labor costs. In China, for example, the establishment of a free trade zone near Guangzhou led to many global firms locating facilities there in the 1990s.

A large number of developing countries also provide additional tax incentives based on training, meals, transportation, and other facilities offered to the workforce. Tariffs may also vary based on the product's level of technology. China, for example, waived tariffs entirely for high- tech products in an effort to encourage companies to locate there and bring in state-of-the-art technology. Motorola located a large chip manufacturing plant in China to take advantage of the reduced tariffs and other incentives available to high-tech products.

Many countries also place minimum requirements on local content and limits on imports to help develop local manufacturers. Such policies lead global companies to set up local facilities and source from local suppliers. For example, the Spanish company Gamesa was a dominant supplier of wind turbines to China, owning about a third of the market share in 2005. In that year, China declared that wind farms had to buy equipment in which at least 70 percent of content was local. These forced players such as Gamesa and GE, which wanted a piece of the Chinese market, to train local suppliers and source from them. In 2009, China revoked the local content requirements. By then, Chinese suppliers had sufficiently large scale to achieve some of the lowest costs in the world. These suppliers also sold parts to Gamesa's Chinese competitors, which developed into dominant global players.

Exchange-Rate and Demand Risk fluctuations in exchange rates are common and have a significant impact on the profits of any supply chain serving global markets. For example, the dollar fluctuated between a high of 124 yen in 2007 and a low of 81 yen in 2010, then back to over 100 yen in 2014. A firm that sells its product in the United States with production in Japan is exposed to the risk of appreciation of the yen. The cost of production is incurred in yen, whereas revenues are obtained in dollars. Thus, an increase in the value of the yen increases the production cost in dollars, decreasing the firm's profits. In the 1980s, many Japanese manufacturers faced this problem when the yen appreciated in value, because most of their production capacity was located in Japan. The appreciation of the yen decreased their revenues (in terms of yen) from large overseas markets, and they saw their profits decline. Most Japanese manufacturers responded by building production facilities all over the world.

The dollar fluctuated between 0.63 and 1.15 euros between 2002 and 2008, dropping to 0.63

euro in July 2008. The drop in the dollar was particularly negative for European automakers such as Daimler, BMW, and Porsche, which export many vehicles to the United States. It was reported that every one- cent rise in the euro cost BMW and Mercedes roughly $75 million each per year.

Exchange-rate risks may be handled using financial instruments that limit, or hedge against, the loss due to fluctuations. Suitably designed supply chain networks, however, offer the opportunity to take advantage of exchange-rate fluctuations and increase profits. An effective way to do this is to build some overcapacity into the network and make the capacity flexible so it can be used to supply different markets. This flexibility allows the firm to react to exchange-rate fluctuations by altering production flows within the supply chain to maximize profits.

Companies must also take into account fluctuations in demand caused by changes in the economies of different countries. For example, 2009 was a year in which the economies of the United States and Western Europe shrank (real GDP in the United States decreased by 2.4 percent)

while that in China grew by more than 8 percent and in India by about 7 percent. During this period, global companies with presence in China and India and the flexibility to divert resources from shrinking to growing markets did much better than those that did not have either presence in these markets or the flexibility. As the economies of Brazil, China, and India continue to grow, global supply chains will have to build more local presence in these countries along with the flexibility to serve multiple markets. **Freight and Fuel Costs**

Fluctuations in freight and fuel costs have a significant impact on the profits of any global supply chain. For example, in 2010 alone, the Baltic Dry Index, which measures the cost to transport raw materials such as metals, grains, and fossil fuels, peaked at 4,187 in May and hit a low of 1,709 in July. Crude oil prices were as low as about $31 per barrel in February 2009 and increased to about $90 per barrel by December 2010. It can be difficult to deal with this extent of price fluctuation even with supply chain flexibility. Such fluctuations are best dealt with by hedging prices on commodity markets or signing suitable long-term contracts. During the first decade of the twenty-first century, for example, a significant fraction of Southwest Airlines' profits were attributed to fuel hedges it had purchased at good prices.

When designing supply chain networks, companies must account for fluctuations in exchange rates, demand, and freight and fuel costs.

Political Factors

The political stability of the country under consideration plays a significant role in location choice. Companies prefer to locate facilities in politically stable countries where the rules of commerce and ownership are well defined. While political risk is hard to quantify, there are some indices, such as the Global Political Risk Index (GPRI), that companies can use when investing in emerging markets. The GPRI is evaluated by a consulting firm (Eurasia Group) and aims to measure the capacity of a country to withstand shocks or crises along four categories: government, society, security, and economy.

4. Infrastructure Factors

The availability of good infrastructure is an important prerequisite to locating a facility in a

given area. Poor infrastructure adds to the cost of doing business from a given location. In the 1990s, global companies located their factories in China near Shanghai, Tianjin, or Guangzhou—even though these locations did not have the lowest labor or land costs—because these locations had good infrastructure. Key infrastructure elements to be considered during network design include availability of sites and labor, proximity to transportation terminals, rail service, proximity to airports and seaports, highway access, congestion, and local utilities.

5. Competitive Factors

Companies must consider competitors' strategy, size, and location when designing their supply chain networks. A fundamental decision firms make is whether to locate their facilities close to or far from competitors. The form of competition and factors such as raw material or labor availability influence this decision.

Positive externalities between firms Positive externalities occur when the collocation of multiple firms benefits all of them. Positive externalities lead to competitors locating close to each other. For example, retail stores tend to locate close to each other because doing so increases overall demand, thus benefiting all parties. By locating together in a mall, competing retail stores make it more convenient for customers, who need drive to only one

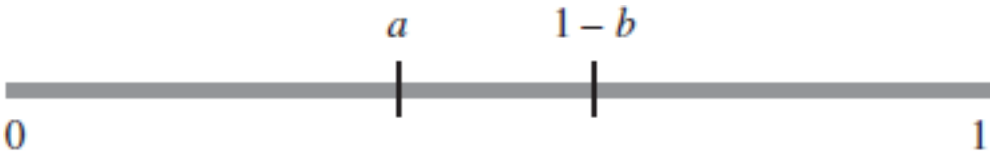


FIGURE 5-1 Two Firms Locating on a Line

location to find everything they are looking for. This increases the total number of customers who visit the mall, increasing demand for all stores located there.

Another example of positive externality occurs when the presence of a competitor leads to the development of appropriate infrastructure in a developing area. In India, Suzuki was the first foreign auto manufacturer to set up a manufacturing facility. The company went to considerable effort and built a local supplier network. Given the well-established supplier base in India, Suzuki's competitors have also built assembly plants there, because they now find it more effective to build cars in India rather than import them to the country.

Locating to Split the Market When there are no positive externalities, firms locate to be able to capture the largest possible share of the market. A simple model first proposed by Hotelling explains the issues behind this decision (Tirole, 1997).

When firms do not control price but compete on distance from the customer, they can maximize market share by locating close to each other and splitting the market. Consider a situation in which customers are uniformly located along the line segment between 0 and 1 and two firms compete based on their distance from the customer as shown in Figure 5-1. A customer goes to the closer firm and customers who are equidistant from the two firms are evenly split between them.

total demand is 1, Firm 1 locates at point a, and Firm 2 locates at point 1- b, the demand at the two firms, d_1 and d_2, is given by

$$d_1 = a + \frac{1 - b - a}{2} \quad \text{and} \quad d_2 = \frac{1 + b - a}{2}$$

Both firms maximize their market share if they move closer to each other and locate at a = b = 1>2. Observe that when both firms locate in the middle of the line segment (a = b = 1>2), the average distance that customers have to travel is 1 >4. If one firm locates at 1 >4 and the other at 3>4, the average distance customers have to travel drops to 1>8 (customers between 0 and 1>2 come to Firm 1, located at 1>4, whereas customers between 1>2 and 1 come to Firm 2, located
at 3>4). This set of locations, however, is not an equilibrium because it gives both firms an incentive to try to increase market share by moving to the middle (closer to 1 >2). The result of competition is for both firms to locate close together, even though doing so increases the average distance to the customer.

If the firms compete on price and the customer incurs the transportation cost, it may be optimal for the two firms to locate as far apart as possible, with Firm 1 locating at 0 and Firm 2 locating at 1. Locating far from each other minimises price competition and helps the firms split the market and maximize profits.

6. Customer Response Time and Local Presence

Firms that target customers who value a short response time must locate close to them. Customers are unlikely to come to a convenience store if they have to travel a long distance to get there. It is thus best for a convenience store chain to have many stores distributed in an area so most people have a convenience store close to them. In contrast, customers shop for larger quantity of goods at supermarkets and are willing to travel longer distances to get to one. Thus, supermarket chains tend to have stores that are larger than convenience stores and not as densely distributed. Most towns have
fewer supermarkets than convenience stores. Discounters such as Sam's Club target customers who are even less time sensitive. These stores are even larger than supermarkets and there are fewer of them in an area. W.W. Grainger uses about 400 facilities all over the United States to provide same-day delivery of maintenance and repair supplies to many of its customers. McMaster-Carr, a competitor, targets customers who are willing to wait for next-day delivery. McMaster-Carr has only five facilities throughout the United States and is able to provide next-day delivery to a large number of customers. If a firm is delivering its product to customers, use of a rapid means of transportation allows it to build fewer facilities and still provide a short response time. This option, however, increases transportation cost. Moreover, there are many situations in which the presence of a facility close to a customer is important. A coffee shop is likely to attract customers who live or work nearby. No faster mode of transport can serve as a substitute and be used to attract customers who are far away from the coffee shop.

7. Logistics and Facility Costs

Logistics and facility costs incurred within a supply chain change as the number of facilities, their location, and capacity allocation change. Companies must consider inventory, transportation, and facility costs when designing their supply chain networks.

Inventory and facility costs increase as the number of facilities in a supply chain increases. Transportation costs decrease as the number of facilities increases. If the number of facilities increases to the point at which inbound economies of scale are lost, then transportation costs increase. For example, with few facilities, Amazon has lower inventory and facility costs than Barnes & Noble, which has hundreds of stores. Barnes & Noble, however, has lower transportation costs.

The supply chain network design is also influenced by the transformation occurring at each facility. When there is a significant reduction in material weight or volume as a result of processing, it may be better to locate facilities closer to the supply source rather than the customer. For example, when iron ore is processed to make steel, the amount of output is a small fraction of the amount of ore used.

Locating the steel factory close to the supply source is preferred because it reduces the distance that the large quantity of ore has to travel.

Total logistics costs are the sum of the inventory, transportation, and facility costs. The facilities in a supply chain network should at least equal the number that minimises total logistics cost. A firm may increase the number of facilities beyond this point to improve the response time to its customers. This decision is justified if the revenue increase from improved response outweighs the increased cost from additional facilities.

4.11 UNIT END QUESTIONS

A. Descriptive Questions Short Questions

1. What is third party logistics?
2. Define push based supply chain?
3. Write a short on inventory control in supply chain?
4. Write a short note on supply chain integration?
5. What are the obstacles of strategic alliances?

Long Questions

1. Differentiate between push and pull based supply chain?
2. What is third and fourth party logistics?
3. What are the uses of Information technology (IT) in supply chain management?
4. What are Retailer and supplier partnership in supply chain management?
5. What is demand forecasting in supply chain management?

B. Multiple Choice Questions

1. Where does distribution occur in the supply chain?
    a. between every pair of stages
    b. everywhere downstream from production
    c. between production and the retailer
    d. between suppliers and retailers
2. Which of the following is not true for supply chain management approach?
    a. joint reduction in channel inventories
    b. large breadth of supplier base to increase competition and spread risk
    c. risks and rewards are shared over long term
    d. companies use intermodal transportation to reach to their markets
3. The retail supply chain does NOT include

a. manufactures
b. retailers
c. wholesalers
d. regulators

4. Which of the following distribution system is more reliable?
   a. radial system
   b. tree system
   c. ring main system
   d. all are equally reliable

5. In a distribution system major cost is that of
   a. earthing system
   b. distribution transformer
   c. conductors
   d. meters

Answers

1-a, 2-b, 3-d, 4-c, 5-b

4.12 References

- Bowersox, D. J., Class, D. J., Cooper, M. B., & Bowersox, J. C. (2013). *Supply Chain Logistics Management* (4th ed.). New York, NY: McGraw-Hill.
- Brealey, R. A., Myers, S. C., & Allen, F. (2017). *Principles of Corporate Finance* (12th ed.). New York, NY: McGraw-Hill.
- Chea, A. (2011). "Activity-Based Costing System in the Service Sector: A Strategic Approach for Enhancing Managerial Decision Making an Competitiveness."
  International Journal of Business and Management, 6(11), 3–10.
- Cooper, R., & Kaplan, R. S. (1988). "Measure Costs Right: Make the Right Decisions."
  Harvard Business Review, 66(5), 96–103.
- Coyle, J. C., Langley, C. J. Jr., Novak, R. A., & Gibson, B. J. (2017). *Supply Chain Management: A Logistics Perspective* (10th ed.). Boston, MA.

Certificate/Diploma Course in
Retail and Sales Management
DRS6–Logistics and Supply Chain Management

UNIT- 5 RECENT TRENDS IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT LOGISTICS INFORMATION SYSTEM

STRUCTURE

5.0 Objectives
5.1 Introduction
5.2 Supply Chain Management Logistics Information System
5.3. Concept of Logistics Information System
5.4. Importance of Logistics Information System
5.5. Principles of Designing LIS
5.6. Logistics Information Architecture
5.7 Application of Information Technology in Logistics and Supply Chain Management
5.8 Requirements of Logistics in E-Commerce
5.9 E- Logistics Structure and Operation
5.10. Unit End Questions
5.11. References

5.0 Objectives

After completing this Students will be able to

- Define Logistics Information System.
- Understand LIS.
- Explain E-logistics structure and operations.
- Explain principles, importance of LIS.

5.1 Introduction

Recent Trends in Logistics and Supply Chain Management:

Logistics and supply chain management have been rapidly evolving fields driven by advancements in technology, changing consumer preferences, globalization, and the need for more efficient and sustainable operations. Several key trends are shaping the landscape of logistics and supply chain management:

1. Digital Transformation: The integration of digital technologies like Internet of Things (IoT), artificial intelligence (AI), machine learning, and blockchain is revolutionizing logistics and supply chain processes. These technologies enhance visibility, predict demand, optimize routes, and enable real-time monitoring, leading to improved efficiency and reduced costs.

2. E-commerce and Omni-channel Retailing:The growth of e-commerce and the demand for seamless shopping experiences have prompted supply chains to adapt to omni-channel distribution models. Companies are focusing on developing agile supply networks that can efficiently fulfill both online and offline orders.

3. Sustainability and Green Logistics: As environmental concerns become more prominent, sustainable practices are gaining traction in logistics and supply chain management. Companies are striving to reduce their carbon footprint through eco-friendly transportation, packaging, and

distribution methods.

4. Data Analytics and Predictive Analytics: Big data analytics plays a crucial role in decision-making by providing insights into customer behaviors, demand patterns, and supply chain disruptions. Predictive analytics helps in foreseeing potential issues and optimizing supply chain processes.

5. Last-Mile Delivery Innovation: The last mile of delivery is a critical aspect of customer satisfaction. Companies are exploring innovative approaches like drone deliveries, autonomous vehicles, and crowdsourcing to make last-mile delivery more efficient and timely.

6. Supply Chain Visibility: Enhanced visibility across the supply chain enables real-time tracking of products, shipments, and inventory levels. This transparency improves coordination among stakeholders and reduces uncertainties.

7. Resilience and Risk Management: The COVID-19 pandemic exposed vulnerabilities in supply chains, leading to a renewed focus on building resilient supply networks that can withstand disruptions. Companies are diversifying suppliers and adopting risk mitigation strategies.

Logistics Information System (LIS):

A Logistics Information System (LIS) is a software-based solution that supports the management and optimization of logistics and supply chain operations. It encompasses various functionalities such as order processing, inventory management, transportation planning, and performance monitoring. LIS enhances decision-making by providing real-time data insights and streamlining processes. It can integrate with other enterprise systems like Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) to ensure seamless data flow across the organization.

5.2 Supply Chain Management Logistics Information System

Logistic information system is nothing but a part of Management Information System to manage, control and measure the logistical activities. These activities occur within the organization or as well as overall across the supply chain.

Logistics information systems are important for achieving logistics efficiency and effectiveness. In an enterprise, logistics information system seeks to achieve the following:

- It ensures of logistics functional operations into a process pursuing customer satisfaction at the lowest total cost.
- Information system facilitates planning and control of the logistical activities related to order fulfilment.
- It makes the firm more competitive, by making better tactical and strategic decision for the benefits of the firm and its customer.
- Helps provide customers information regarding product availability, order status, and delivery schedules promoting customers service.
- It reduces the requirements of inventory and human resources by enabling requirements planning.
- It interfaces with marketing, financial, and manufacturing information systems and provides information to top management to help formulate strategic decisions for the whole firm.

- The use information technology in information systems has enabled quick response to demand making forecasting redundant. This has also helped in implementing “pull” systems like just-in- time making the firm more competitive.
- It promotes systems that link the operations of the firm, such as manufacturing and distributing, with the suppliers operations on the one hand the customer on the other.
- In the other cases, organizations are finding that through information they can manage dispersed inventories as if they were single inventory. The benefits of this can be considerable. If inventory management is centralised and decisions on replenishment and other quantities are taken or the basis that is a single stock, then only one safety stock instead of many required. The stock itself can be carried anywhere in the system, either near the point of production or the consumption. This is the concept of ‘virtual’ inventory management or electronic inventory management.

5.3 Concept Of Logistics Information System

Logistics information systems were created in order to eliminate errors in operations taking place inside and outside the warehouse. The use of different applications in the product manufacturing, storage, and shipping processes boosts efficiency in the supply chain.

These logistics management programs foster **digital warehousing**, i.e., facilities in which tasks such as inventory control and order picking are executed by software, avoiding delays and mistakes in these operations.

Fig: 5.1 Logistics Information System



What are logistics information systems?

Logistics information systems (LIS) are digital programs that are implemented to facilitate decision- making and the management of operations such as procurement, storage, order picking,

and the shipment and transportation of goods.
These logistics applications ensure continuous flows of information between companies involved in the design, manufacture, storage, and marketing of a product or service, connecting all the organizations and supporting product traceability.

Depending on which tasks in the warehouse are automated, different types of logistics information systems can be used. For example, a transportation management system (TMS) plans and organises delivery routes, while an enterprise resource planning (ERP) system syncs processes and data between departments in a company — including the logistics division.
Nevertheless, a warehouse management system (WMS) is the information system that acts as the brain of the facility. That is, it controls everything occurring inside the building, from goods receipt to shipments of orders to end customers. Deploying a digital solution such as a WMS minimises the possibility of error due to manual management. How? This software guides operators in tasks such as stock replenishment, order picking, and goods shipment planning.
Likewise, in automated warehouses, WMS software coordinates the automatic equipment as well as operator tasks. These digital programs not only greatly increase product flows, but also improve safety in the facility.
Paper-based or electronic, used to aggregate, analyse, validate and display data from all levels of logistics system that can be used to make logistics decisions and manage the supply chain.

The role of LIS can be understood from the following:
a) LIS ensures the transformation of logistics functional operations into a process with the goal of pursuing customer satisfaction at the lowest cost. It facilitates planning and control of logistics activities related to order fulfilment.
b) LIS provides information on goods and tracks the delivery, by giving their status.
c) Logistics systems depend on outside information and international standards to comply with regulations and use laid down ways of sharing logistic information with others.
d) The manufacturers and traders monitor the actual products to know whether they will arrive on time and in proper condition at the delivery places, and to be able to take prompt action in case of any lapse.
e) Transporters focus on the progress and status of the means of transport. In case of any delays or exigencies, transporters can report these to their customers who can consider the impact.
f) Customs authorities and those responsible for ensuring the safety and security of goods during transportation are given details about the content of goods and their means of transport.
LIS is part of logistics management to manage, control and measure the logistical activities within the organisation and across the supply chain, achieving logistics efficiency and effectiveness.
Within an organisation, LIS achieves the following:
a) Customer satisfaction at the lowest total cost.
b) Enables planning and control of the logistical activities related to order fulfilment.
c) Fosters better tactical and strategic decisions for the benefit of the firm and its customers.
d) Gives information to customers regarding product availability, order status, and delivery

schedules.

e) Enables resource planning thereby reducing the requirements of inventory and human resources.

Logistics Information System

Logistics Management: Components

a. Provides information to top management to formulate strategic decisions by interface with marketing, financial, and manufacturing information systems.
b. Links the operations of the business, such as manufacturing and distribution, with the supplier‟s operations and the customers.
c. Facilitates „virtual‟ inventory management or electronic inventory management by managing dispersed inventories through information technology. Inventory management becomes centralised and decisions on replenishment and other quantities are taken based on a single stock.

5.4. Importance Of Logistics Information System

The importance of logistics systems lies in the fact that it leads to ultimate consummation of the sales contract. The buyer is not interested in the promises of the seller that he can supply goods at competitive price but that he actually does so. Delivery according to the contract is essential to fulfilling the commercial and legal requirements. In the event of failure to comply with the stipulated supply of period, the seller may not only get his sale amount back, but may also be legally penalised, if the sales

contract so specifies. There is no doubt that better delivery schedule is a good promotional strategy when buyers are reluctant to invest in warehousing and keeping higher level of inventories. Similarly, better and/or timely delivery helps in getting repeat orders through creation of goodwill for the supplier.

Thus, as effective logistics system contributes immensely to the achievements of the business and marketing objectives of a firm. It creates time and place utilities in the products and thereby helps in maximising the value satisfaction to consumers. By ensuring quick deliveries in minimum time and cost, it relieves the customers of holding excess inventories. It also brings down the cost of carrying inventory, material handling, transportation and other related activities of distribution. In nutshell, an efficient system of physical distribution/logistics has a great potential for improving customer service and reducing costs.

Logistics has gained importance due to the following trends

- Raise in transportation cost.
- Production efficiency is reaching a peak
- Fundamental change in inventory philosophy
- Product line proliferated
- Computer technology
- Increased use or computers
- Increased public concern of products Growth of several new, large retail chains or mass merchandise with large demands & very sophisticated logistics services, by pass traditional channel & distribution.
- Reduction in economic regulation

- Growing power of retailers
- Globalization

As a result of these developments, the decision maker has a number of choices to work out the most ideal marketing logistics system. Essentially, this system implies that people at all levels of management think and act in terms of integrated capabilities and adoption of a total approach to achieve pre- determined logistics objectives.

Logistics is also important on the global scale. Efficient logistics systems throughout the world economy are a basis for trade and a high standard of living for all of us. Lands, as well as the people who occupy them, are not equally productive. That is, one region often has an advantage over all others in some production specialty. An efficient logistics system allows a geographical region to exploit its inherent advantage by specialising its productive efforts in those products in which it has been an advantage by specialising its productive to other regions. The system allows the products' landed cost (production

plus logistics cost) and quality to be competitive with those form any other region. Common examples of this specialisation have been Japan's electronics industry, the agricultural, computer and aircrafts industries of United States and various countries dominance in supplying raw materials such as oil, gold, bauxite, and chromium.

Furthermore, Logistics has gained importance in the international marketing with the following reasons:

1. Transform in the customers' attitude towards the total cost approach rather than direct cost approach.
2. Technological advancement in the fields of information processing and communication.
3. Technological development in transportation and material handling.
4. Companies are centralising production to gain economies of scale.
5. Most of the MNC organizations are restructuring their production facilities on a global basis.
6. In many industries, the value added by manufacturing is declining as the cost of materials and distribution climbs.
7. High volume data processing and transmission is revolutionising logistics control systems.
8. With the advancement of new technologies, managers can now update sales and inventory planning faster and more frequently, and factories can respond with more flexibility to volatile market conditions.
9. Product life cycles are contracting. Companies that have gone all out to slash costs by turning to large scale batch production regularly find themselves saddled with obsolete stocks and are unable to keep pace with competitors' new-product introductions.
10. Product lines are proliferating. More and more product line variety is needed to satisfy the growing range of customer tastes and requirements, and stock levels in both field and factory inevitably rise.
11. The balance of power in distribution chain is shifting from the manufacturers to the trader.

5.5. Principles Of Designing Lis

Principles of Logistics Information System

Availability Logistics information must be readily and consistently available. Information may be regarding order status, inventory status, etc Rapid availability is very important to respond to decisions. Information availability can reduce customer requirements and improve management uncertainties in operations and planning

Accuracy Logistics information must reflect the current status of all the activities like inventory levels, customer orders etc. E.g.: The actual level of inventories should match with the LIS reported inventory levels. However if there is a large difference between the actual inventories and those indicated by the information system inventory levels, buffer stock or safety stock would be required to cover up the uncertainty.

Timeliness The logistics information must be timely to provide quick management feedback. Timeliness is measured in terms of delay that takes place between the commencement and occurrence of an activity and when the activity is actually visible in the logistical information system. E.g.: a company may receive a certain order which a customer desires to be executed urgently. However, the database information system of the company is not fed with the details regarding the urgency of the order for whatever reasons. This will cause delay in the actual execution of the order. This delay indicates ineffectiveness in the planning process. Similar delays can occur when the goods are moved from VVIP to finished goods. All this calls for timely management controls so that corrective actions can be taken to minimize loss. Hence timely information is very necessary to reduce uncertainty.

Exception based LIS Logistics operations have to deal with a large number of customers, products, suppliers, etc. E.g.: the status regarding inventory level for each product regarding the amount of stock available, where the stock is located, etc. must be known. Another activity whose status requires to be reviewed several times is the outstanding replenishment orders. Such activities whose status requires a continuous review are considered as exceptions in the logistical information system. Other examples of exception situations that LIS should highlight are a) very large orders b) products having little or no inventory c) delayed shipments d) decrease in operating productivity

Flexibility LIS must contain the capability to be flexible in order to meet the needs of both, the system users and the customers. E.g.: A particular retailer may want invoices for each of his retail stores.

Another retailer may require only one invoice for all his retail stores. The LIS must be flexible to accommodate both the retailers.

Appropriate format Logistics reports must be appropriately formatted so that they contain the right information in the right structure and the right sequence. E.g.: If a company has five distribution centre, then on one computer screen, the details of inventory at all the five distribution centres should be available. The combined data on one screen helps to make the better decisions.

5.6 Logistics Information Architecture

Logistics information systems provide information on goods and follow their delivery path, with

their progress and status, and the influence of changes on the purchasing, production, warehousing, financial and accounting systems. Logistic systems depend on external information and international standards to comply with regulations, and to use standardised ways of exchanging logistic information with other systems and with authorities.

An important difference between these systems is whether the emphasis is on the content of the goods or on the transport equipment or transport means used. Manufacturers and traders want to monitor the actual products and articles to know whether they will arrive on time and in proper condition at the delivery places, and to be able to take prompt action when incidents happen. Transporters are focussed on the progress and status of the transport means and the transport equipment in them. If incidents or delays happen, transporters can report these to their clients but the impact on delivering or restocking can only be understood by the traders and manufacturers. For commercial reasons, the transporter may not actually know the details of the goods. Authorities, especially Customs and authorities responsible for security in transport, have an interest in the content of goods, as well as the transport means and equipment used to transport them. Information Logistics (IL) deals with the flow of information between human and / or machine actors within or between any number of organizations that in turn form a value creating network (see, e.g.). IL is closely related to information management, information operations and information technology.

The goal of Information Logistics is to deliver the right product, consisting of the right information element, in the right format, at the right place at the right time for the right people at the right price and

all of this is customer demand driven. If this goal is to be achieved, knowledge workers are best equipped with information for the task at hand for improved interaction with its customers and machines are enabled to respond automatically to meaningful information.

Methods for achieving the goal are:

the analysis of information demand intelligent information storage

the optimization of the flow of information securing technical and organisational flexibility integrated information and billing solutions

The expression was formed by the Indian mathematician and librarian S. R. Ranganathan (Reference is missing!!!).

The supply of a product is part of the discipline Logistics. The purpose of this discipline is described as follows:

Logistics is the teachings of the plans and the effective and efficient run of supply. The contemporary logistics focuses on the organization, planning, control and implementation of the flow of goods, money, information and flow of people.

Information Logistics focusses on information. Information (from Latin informare: “shape, shapes, instruct”) means in a general sense everything that adds knowledge and thus reduce ignorance or lack of precision. In stricter sense information becomes information only to those who can interpret it.

Interpreting information will provide knowledge.

5.7 Application Of Information Technology In Logistics And Supply Chain Management

What Is Information Technology

Information technology is simple the processing of data via computer: the use of technologies from computing, electronics, and telecommunications to process and distribute information in digital and other forms.

Information Technology, or IT, is the study, design, creation, utilisation, support, and management of computer-based information systems, especially software applications and computer hardware.

IT is not limited solely to computers though. With technologies quickly developing in the fields of cell phones, PDAs and other handheld devices, the field of IT is quickly moving from compartmentalised computer-focused areas to other forms of mobile technology.

What Is Logistics and Supply Chains?

A supply chain is the network of suppliers, distributors and subcontractors used by a manufacturer to source its raw materials, components and supplies. Logistics companies store, transport and distribute supplies and work-in-progress within the supply chain and distribute finished products to customers or intermediaries. Integrating supply chain and logistics operations improves efficiency and reduces costs, increasing the manufacturer's competitive advantage.

This article focuses the role of Information technology (IT) in supply chain management. I will try to show the contributions of IT in helping to restructure the entire distribution set up to achieve higher service levels and lower inventory and lower supply chain costs. Fundamental changes have occurred in

today's economy. These changes alter the relationship we have with our customers, our suppliers, our business partners and our colleagues. IT developments have presented companies with unprecedented opportunities to gain competitive advantage. So IT investment is the pre-requisite thing for each firm in order to sustain in the market.

IT and Supply Chain Integration

Supply chain management (SCM) is concerned with the flow of products and information between supply chain members' organizations. Recent development in technologies enables the organization to avail information easily in their premises. These technologies are helpful to coordinates the activities to manage the supply chain. The cost of information is decreased due to the increasing rate of technologies. In an integrated supply chain where materials and information flow in a bi-directional, Manager needs to understand that information technology is more than just computers.

At the earliest stage of Supply Chain (the late80s) the information flow between functional areas within an organization and between supply chain member organizations were paper based. The paper based transaction and communication was slow. During this period, information was often over looked as a critical competitive resource because its value to supply chain members was not clearly understood. An IT infrastructure capability provides a competitive positioning of business initiatives like cycle time reduction, implementation, implementing redesigned cross-functional processes. Several well know organizations that are involved in supply chain relationship through information technology have ripe huge gain through integration. Three factors have strongly impacted this change in the importance of information. First, satisfying and pleasing customer has become something of a corporate obsession.

Serving the customer in the best, most efficient and effective manner has become critical. Second information is a crucial factor in the managers' abilities to reduce inventory and human resource requirement to a competitive level and finally, information flows plays a crucial role in strategic planning.

Supply chain organisational functions

All enterprises participating in supply chain management initiatives accept a specific role to perform. They also share the joint belief that they and all other supply chain participants will be better off because of this collaborative effort. Power within the supply chain is a central issue. There has been a general shift of power from manufacturers to retailers over the last decades. Retailers sit in a very important position in term of information access for the supply chain. Retailers have risen to the position of prominence through technologies.

The examples and experiences of some firms in the Retails Supermarkets has demonstrated how information sharing can be utilised for mutual advantage. Through sound information technologies,

firm's shares point of sale information from its many retail outlet directly with their Manufacturers and other major suppliers.

The development of Inter organisational information system for the supply chain has three distinct advantages like cost reduction, productivity, improvement and product/market strategies.

Firms can collaborate and participation within five basic levels in the interorganizational information system.

Remote Input/output mode: In this case the member participates from a remote location with in the application system supported by one or more higher-level participants.

Application processing node: In this case a member develops and shares a single application such as an inventory query or order processing system.

Multi participant exchange node : In this case the member develops and shares a network interlinking

itself and any number of lower level participants with whom it has an established business relationship. Network control node: In this case the member develops and shares a network with diverse application that may be used by many different types of lower level participants.

Integrating network node: In this case the member literally becomes a data communications/data processing utility that integrates any number of lower level participants and applications in real times. Information and Technology: Application in Supply Chain Management

In the development and maintenance of Supply chain's information systems both software and hardware must be addressed. Hardware includes computer's input/output devices and storage media. Software includes the entire system and application programme used for processing transactions management control, decision-making and strategic planning.

How IT can be applied in Supply Chain Management

Electronic Commerce: It is the term used to describe the wide range of tools and techniques utilized to conduct business in a paperless environment. Electronic commerce therefore includes electronic data interchange, e-mail, electronic fund transfers, electronic publishing, image processing, electronic bulletin boards, shared databases and magnetic/optical data capture. Companies are able to automate the process of moving documents electronically between

suppliers and customers.

Electronic Data Interchange: Electronic Data Interchange (EDI) refers to computer-to-computer exchange of business documents in a standard format. EDI describe both the capability and practice of communicating information between two organizations electronically instead of traditional form of mail, courier, & fax. The benefits of EDI are:

1. Quick process to information.
2. Better customer service.
3. Reduced paper work.
4. Increased productivity.
5. Improved tracing and expediting.
6. Cost efficiency.
7. Competitive advantage.
8. Improved billing.

Though the use of EDI supply chain partners can overcome the distortions and exaggeration in supply and demand information by improving technologies to facilitate real time sharing of actual demand and supply information.

Bar coding and Scanner: Bar code scanners are most visible in the checkout counter of super market. This code specifies name of product and its manufacturer. Other applications are tracking the moving items such as components in PC assembly operations, automobiles in assembly plants.

Data warehouse: Data warehouse is a consolidated database maintained separately from an organization's production system database. Many organizations have multiple databases. A data warehouse is organised around informational subjects rather than specific business processes. Data held in data warehouses are time dependent, historical data may also be aggregated.

Enterprise Resource planning (ERP) tools: Many companies now view ERP system (egg. Baan, SAP, People soft, etc.) as the core of their IT infrastructure. ERP system have become enterprise wide transaction processing tools which capture the data and reduce the manual activities and task associated with processing financial, inventory and customer order information. ERP system achieve a high level of integration by utilising a single data model, developing a common understanding of what the shared data represents and establishing a set of rules for accessing data.

Benefits of IT application in Supply Chain Management

Streamlining—Communicate and collaborate more effectively with suppliers worldwide.
Connecting—Make the connection between what your customers want and what you produce.
Analysing—Analyse your supply chain and manufacturing options and choose the plan that makes best use of your assets.
Synchronising—Synchronise the flow of your batch production by managing the capacity of vessels, tanks, and lines-and the flow between them.
Communicating—Improve your communication and collaboration with suppliers worldwide.
Designing—Create the optimal supply chain network and adapt the network to keep pace with changes in your business.
Transforming—Transform processes inside the warehouse and across the supply chain to meet

demands for new efficiencies.

Understanding—Get a better understanding of your warehouse labor activities and implement the changes you need to optimise worker performance.

Maximising—Maximize warehouse profits by using advanced costing, billing, and invoicing capabilities. **Optimising**—Optimise your day-to-day fleet performance to reduce costs and improve customer satisfaction.

Conclusion:

World is shrinking day by day with advancement of technology. Customers' expectations are also increasing and companies are prone to more and more uncertain environment. The IT field is evolving and developing every day. New technologies in computers and mobile devices are shaping the way the world communicates with one another, gets work done, and spends free time. Companies will find that their conventional supply chain integration will have to be expanded beyond their peripheries. The strategic and technological innovations in supply chain will impact on how organizations buy and sell in the future. However clear vision, strong planning and technical insight into the Internet's capabilities would be necessary to ensure that companies maximize the Internet's potential for better supply chain management and ultimately improved competitiveness. Internet technology, World Wide Web, electronic commerce etc. will change the way a company is required to do business. These companies
must realize that they must harness the power of technology to collaborate with their business partners. That means using a new breed of SCM application, the Internet and other networking links to observe past performance and historical trends to determine how much product should be made as well as the best and cost effective method for warehousing it or shipping it to retailers.

5.8 Requirements Of Logistics In E-Commerce

Your e-commerce start-up has defied the odds. You've grown it from an idea on the back of an envelope into a full-fledged company with real customers and real revenue. However, your success could lead to your downfall if you're spending too much on logistics or not shipping products the way customers expect.

Perhaps you're selling unique sustainably sourced apparel, non-toxic pet toys, or eco-friendly home decor. Regardless of the product mix, your company may be ready to outgrow your current e-commerce
logistics situation. Your dream come true could turn into a logistics nightmare. After all, you may be an expert in your niche, but logistics is a science all its own.

One of the advantages of a digital native vertical brand startup is your company isn't saddled with legacy systems and procedures. You can incorporate best practices from the beginning rather than rediscover them along the way. You can integrate technology and analytics from the ground up that will help you control costs and deliver on your brand promise.

A wise person once said "you'd better learn how to manage your inventory before it manages you". After all, inventory on a shelf or rack represents your investment in the business. Tracking that inventory is critical for your cash flow and opens the way for more complex analysis that will guide your strategic thinking.

Managing logistics in e-commerce is critical — it's essentially the core of your company.

Depending on what stage you're in, it may be time to partner with third parties to store your products and fulfils your services.

As you're planning for the future of your business, here are some things you need to consider to take your e-commerce logistics to the next level.

Demand Planning

Retailers typically base their inventory forecasts on historical data. As a start up, you may not have that luxury. So how do you know how much inventory you'll need? There are a few techniques to use until you build your own sales history.

First, monitor site traffic and social sharing. If your social media efforts start to pay off, demand could spike, and you'll want to be ready. Look at seasonal trends such as changes in the weather and holiday- driven purchases. If spring comes early, outdoor items and apparel could see unanticipated demand.

Of course, stock up to support your promotional efforts such as discount codes and free shipping thresholds. Scalable warehouse space can help you plan for increasing demand without investing in long-term leases.

Visibility

As your e-commerce logistics needs grow, it becomes more difficult to see the big picture. Companies that experience rapid growth may add logistics capacity in an ad hoc fashion, bolting on pieces to deal with a surge in orders or new products. Perhaps you've expanded to use several warehouses, drop shippers or other logistics tactics.

However, those pieces may not communicate very well, leaving the organization with an incomplete picture of their inventory and sales performance. It can be difficult to see your entire inventory situation and have that reflected in quantity counts on your internal systems as well as on your website.

Shoppers want to be able to see if an item is available before they go through the checkout process. It's a balancing act to keep enough stock on hand but not have excess inventory tying up cash and shelf space. The answers are different depending on your market space, and the best solution is always a moving target. Work with logistics providers who can help you develop the systems and operational discipline to make your inventory work for you.

Free Shipping

In a recent study, 73 percent of online shoppers said unconditional free shipping was "critical" to their purchase decision, according to Inc. magazine. Amazon boasts more than 100 million Prime subscribers worldwide, Fortune magazine reported, so free and fast shipping is obviously vital to consumers.

The advent of free shipping is both a curse and a blessing for e-commerce sellers. It wasn't too long ago that 10-day delivery time was standard. Then in 2014 delivery times fell to about six days. By 2016, it had shrunk to three days. Now it's closer to two days, and overnight for some Amazon shipments.

The thought of no-cost shipping spurs many online purchases, but of course, the shipping is only free to the consumer. The shipper must be as disciplined as possible to reduce cost while providing the service customers expect.

Your customers now expect two to three days for delivery, but don't want to pay for it.

Marketing techniques like minimum order sizes or promotional offers can help drive orders with free-shipping offers. Discipline in your supply chain can reduce costs to make free shipping a competitive advantage rather than a financial drain.

Last Mile

Last-mile service typically represents up to 28 percent of the total shipping costs, according to a study from the University of Delaware.

Keep in mind the last mile may be a lot longer than an actual mile — we're talking about the final delivery step to the consumer. That may be via UPS, FedEx, or the U.S. Postal Service or another carrier. For a B2B delivery, the last mile could occur via an LTL carrier.

Consumers may judge their entire interaction with your company based on the delivery experience. A sustainable last-mile strategy must satisfy consumer expectations while balancing costs and resource requirements. For instance, app-based last mile logistics providers may allow smaller players to compete with Amazon for tight delivery windows.

Reflecting the increasing competition, e-commerce companies are beginning to focus on the last yard service -, the next level of granularity. The last yard represents the customer receiving a package and moving to the end user. Think of shippers stocking customers' refrigerators with fresh produce or delivering parcels to package lockers. In a recent study more than 70 percent of shippers and third party logistics providers (3PLs) recognised the need for "last-yard" services,

Managing Returns

Also known as reverse logistics, managing returns may be the most challenging aspect for e-commerce sellers. The average return rate at a brick-and-mortar store is 8 to 9 percent, and for e-commerce can reach 24 to 36 percent, according to Transport Topics.

Experts say to handle returns properly, a retailer should consider a return as a reverse purchase with all the same care and oversight that goes into managing the original purchase.

Your return policies help incentive buyers who can purchase with confidence that they won't be stuck with products that don't suit their needs. However, your enterprise must have a clear understanding of the costs and logistics implications to those returns. Do you pay for return shipping? Do you charge a restocking fee? Do you resell the items or liquidate them through a wholesaler?

One key to managing returns is to keep them separate from the forward-moving supply chain of new products. Create separate locations, even a small section of your warehouse, and assign staff to manage the reverse logistics supply chain. Commercial mini- warehouse locations operated by Warehouse Anywhere allow for low-cost, flexible space to handle returns separate from outbound products.

Decentralised Warehousing

The latest trend in e-commerce is moving the product closer to the customer. Rather than fulfilling orders from a few regional million-square-foot distribution centres, companies are using smaller facilities closer to population centres. The smaller facilities are more responsive to customer orders and can reduce delivery times.

This strategy shortens the last mile to the customer. These facilities could be mini-warehouses or dedicated fulfilment centres. Some brick-and-mortar stores are converting retail locations into shipping centres, devoting some or all of the footprint to fulfilment. Warehouse Anywhere

operates flexible warehouse space in over 10,000 locations nationwide, allowing you to place inventory exactly where you need it.

The distributed inventory strategy enables shippers to offer same day or overnight fulfilment in major cities, allowing them to compete with Amazon on shipping time. Reducing shipping distances will in turn reduce costs and improve service. Regionalised inventory opens up the possibility of using regional carriers, metro area couriers and other delivery options that aren't possible over longer distances.

3PL Relationships

Fast-growing e-commerce shippers are outsourcing some or all of their logistics functions to a third- party logistics provider or 3PL. A 3PL can manage inbound shipments of product, stock and track inventory and handle all aspects of fulfilment. Your company can concentrate on its core competencies and outsource logistics operations.

Functioning as a 3PL, Warehouse Anywhere can handle warehousing, fulfilment and transportation relationships and ensure the customer experience meets your brand standards. Look for a 3PL that provides data on sales and inventory management to support strategic decision-making. Also, a 3PL has long-term relationships with carriers so shippers typically receive better rates than they could negotiate on their own. The 3PL will have relationships with specialized and niche carriers for regional and parcel services.

A 3PL serves as a strategic partner to help e-retailers compete with some of the digital giants in post- click fulfilment.

The lines between online and physical retailer are blurring as e-tailors' open stores and retailers add more e-commerce capabilities. No matter where your start up is on that spectrum, the e-commerce supply chain is essential for your company's future. Understanding and leveraging these trends will ensure that you have the strategy and relationships to support your mission.

5.9. E-Logistics Structure and Operation

A firm desirous of offering goods on the Internet needs to develop a proper infrastructure for electronically integrating all the operations of logistics in order to ensure customer satisfaction before, during and after the buying process.

1. Order Processing

The customer, after opening the website, may select one or more items for purchasing. Many websites offer an electronic bucket for customers to pick up the items they want to purchase. The dialog box requires reconfirmation from the customer through the price checking. For the low unit price items or low-value orders, the full payment may be asked through credit card. However, for a large- value order the customer may not pay the full amount at one stroke through credit card. In such cases, the order will be processed with credit terms as per the company norms, after considering the payment history of the client.

For repeat purchases in the case of B2B transactions, the order-processing system needs to build a database of the order history for offering discounts or certain credit concessions or for giving an

automatic signal for execution. The inbuilt software will check the prices, taxes, payment terms and delivery. The order will be accepted for execution only after it is technically and

commercially cleared and the same will be confirmed to the client electronically.

The order processing on some sites is done online, while many go in for batch processing at the end of the day. For the e-commerce company order processing is of critical importance as it involves the setting up of system standards to meet customer expectations. Depending on the volume of the orders, the firm may process the order on an hourly or a daily basis. The investment in online order processing can be justified on the basis of the volume of order inflow.

2. Inventory Management

Depending on the business model, the inventory movement needs to be organised after checking with the warehouse or the vendor partners. In e-business the firm has to integrate online order capture with order processing, inventory and fulfilment system. In case an item is not in stock and is under process, late delivery will have to be confirmed to the client before the order is accepted. For stock items the replenishment instructions will be issued as soon as an item is removed from the shelves. The retail giant Walmart uses the Automatic Inventory Tracking System for replenishing the inventory directly by the vendors. The system is connected to all of Wal-Mart's vendors and 2500 retail shops across the United States. In e-commerce, honouring delivery commitments to customers must be seen as paramount if the seller is to remain competitive. So, the firm needs to have a backup inventory control system that closely coordinates the resources and monitors inventory movement, right from the source of supply to manufacturing to distribution centres and, finally, to the customers.

3. Order Execution

Once an order is accepted for execution, order filling instructions are passed on to the inventory manager or directly to the vendor for case filling and packaging. The delivery instructions will incorporate the consignee details, item details, quantity and packaging. The vendor or warehouse manager instructs the courier or 3PL partner to pick up the consignment for delivery to the client. All this is done electronically. The delivery details will be immediately conveyed to the customer along with the invoice copy for him/her to be ready with the balance payment against delivery by the courier or logistics firm.

4. Shipping

Based on the size of the order and the consignment, the transportation will be organised either through a courier service or through the logistics partner of the firm. The Decision software will decide online on the choice of the carrier, transportation mode and scheduling of the dispatch considering the client's location, public holidays and other eventualities. Some e-commerce sites offer the customer to place an order before the closing of the day for delivery next morning by10 a.m.

5. Tracking and Tracing

After placement of an order, the client always wants to know the order status or whereabouts of the products during transit. The bar coding system with satellite communication will help track the consignment. Most sellers provide the consignment tracking facility to the client as a value-added service on their websites.

6. Payments

Payments for a B2C transaction are accepted through credit or debit cards.

In B2B transactions, the system needs credit management support to decide on the credit terms to

clients, based on their payment history and the volume of business received. The system needs to generate online invoices, deliver notes, payment outstanding reports, payment reminders, and so forth, using EDI.

7. Transaction Security

Transaction security can be enhanced by using an electronic fraud-checking system that checks the customer's credit card electronically by running an anti-fraud algorithm or another type of authentication system at the time of order processing or material dispatch.

8. Order Postponement, Cancellation and Substitutions

The e-commerce firm has to carefully evolve its policies for order cancellation, postponement and offering substitutes in the event an inventory is not available. Such a situation may arise because of some problem in the supply chain or due to circumstances beyond the management's control. In such cases, the firm may have to inform the customer in time and request for cancellation of orders.

Alternatively, the firm may offer substitute products or postpone the delivery. The system should automatically signal the likely eventualities of stock-outs so that the customers are informed well in advance.

9. Reverse Material Flow

In the event the customer does not like the product, or it has been damaged during transit, or the product performance is below expectation, the firm needs to evolve a product-return policy for issuing guidelines to customers and the operating people of the firm. The time frame to lodge a complaint or return the product at the assigned collection centres has to be carefully spelt out in the sales contract displayed on the website. The responsibilities of both seller and buyer for return of goods have to be indicated to avoid customer dissatisfaction. The machinery to take care of reverse material flow may be a stand-alone system or integrated to forward the supply chain of the firm, depending on the volumes involved in the reverse flow.

Dell Computers represent one of the most successful e-commerce, logistics and supply chain stories. To compete with giants like IBM, Apple and Compaq, Dell has adopted a different strategy to market their PCs. They chose the e-commerce route. To order a PC with the desired configuration and specification, the customer has to log on to the Dell website, place an order and complete the online commercial formalities. There are good chances that the customer will get the PC the next day if he happens to be in the United States. The electronic commerce system installed on the Dell website registers an order after online completion of commercial formalities. The system estimates the demand of the various components going into the computer and places the orders for parts on the various suppliers. The suppliers then deliver the parts to predetermined supply centres where the computer is assembled.

While registering the order, the system communicates the details of the customer and delivery location to the logistics partner. The office of the logistics partner nearest to the Dell supply centre gets activated to pick up the material for delivery. The result of an efficient process such as this is a near-zero inventory and total customer satisfaction.

Blue Dart is one of the leading logistics service providers with e-commerce initiative in India. Blue Dart offers e-business solutions to facilitate seamless integrated transportation, distribution and supply chain management and helps leading multinational companies to sort out their B2B

or B2C logistics problems through Web-based solution. The registered customer can log on to the Blue Dart website and make advanced online queries on shipment status, freights, transit time, billing, pricing and scheduling.

In short, the e-linkage in e-commerce facilitates buying and selling through the Internet. It provides an online communication link for buyer, seller, vendors and logistics partners. Apart from the responsibility of physical distribution of goods, Blue Dart provides online delivery status and payment facility.

E-commerce logistics efficiency and effectiveness depends on the comprehensiveness of Web-based logistic solutions. Operational efficiency improvement requires timely communication across the extended business enterprise from customer to warehouses, distribution centres, manufacturer, vendors, transporters, and the like. The Web provides the way to access the information stored in the

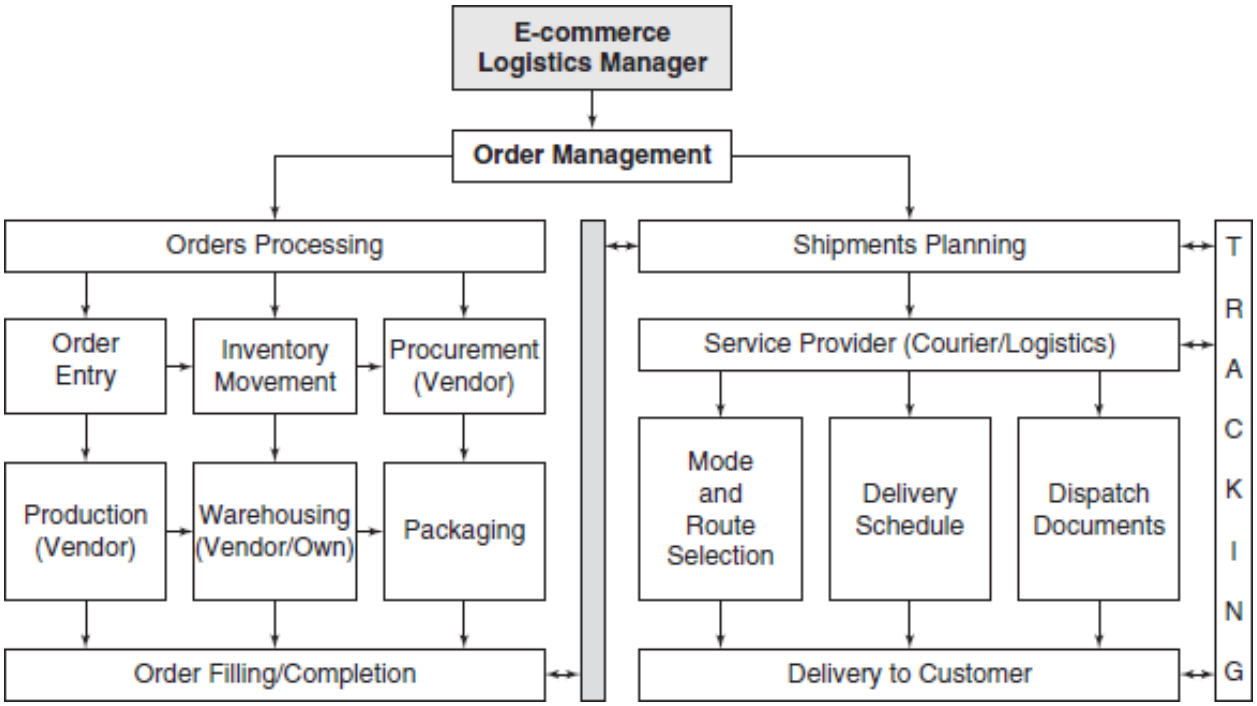


Fig: 5.2 E-Commerce Logistics Software Application

transaction database

The e-commerce logistics software involves application in both Internet and intranet Web- based business solutions, since customer satisfaction depends on the efficiency and effectiveness of coordination of the business processes within and outside the organization.

5.10 Unit End QUESTIONS

Descriptive Questions Short Questions

1. What E-logistics structure?
2. Explain the importance of LIS?
3. Write a short on Requirement of logistics in e-commerce?
4. Write a short note on principles of designing LIS?
5. What are the Logistics information architecture?

Long Questions

1. Explain the concept and importance of logistics information system?
2. Explain the principles of logistics information system?
3. What are the requirements of logistics in E-commerce?
4. Explain E-Logistics Structure and operations?
5. Is logistics information system important for a company to run smoothly. Explain in detail with its importance?

B. Multiple Choice Questions

1. Which of the following is not a component of 4PL?
    a. Control Room (Intelligence)
    b. Resource Providers
    c. Information
    d. Recycling

2 ..... is the provision of service to customers before, during and after a purchase.
    a. Customer Service
    b. Product Management
    c. Purchase management
    d. None of the above

3 ..... is the task of buying goods of right quality, in the right quantities, at the right time and at the right price.

    a. Supplying
    b. Purchasing
    c. Scrutinising
    d. None of the above

4. What is the key objective of a Logistics Information System (LIS)?
    a. Maximizing product sales
    b. Minimizing employee turnover
    c. Enhancing communication between departments
    d. Improving the efficiency of logistics operations
5. In the context of supply chain management, what does "logistics" primarily involve?
    a. Financial transactions
    b. Raw material extraction
    c. Movement and storage of goods
    d. Employee training programs

Answer:

1 - d, 2 - a, 3 - b, 4 – d, 5 - c

5.11 References

- Bowersox, D. J., Closs, D. J., Cooper, M. B., & Bowersox, J. C. (2013). *Supply Chain Logistics Management* (4th ed.). New York, NY: McGraw-Hill.
- Brealey, R. A., Myers, S. C., & Allen, F. (2017). *Principles of Corporate Finance* (12th ed.). New York, NY: McGraw-Hill.
- Chea, A. (2011). "Activity-Based Costing System in the Service Sector: A Strategic Approach for Enhancing Managerial Decision Making and Competitiveness." *International Journal of Business and Management*, 6(11), 3–10.
- Cooper, R., & Kaplan, R. S. (1988). "Measure Costs Right: Make the Right Decisions." *Harvard Business Review*, 66(5), 96–103.
- Coyle, J. C., Langley, C. J. Jr., Novack, R. A., & Gibson, B. J. (2017). *Supply Chain Management: A Logistics Perspective* (10th ed.). Boston, MA.