



20MBO301 - SUPPLY CHAIN AND LOGISTICS MANAGEMENT

Prepared by

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COURSE OBJECTIVES

The objective of the course is to understand the scope and practice of business logistics and to explore contemporary trends and issues for effective supply chain management.

CO1 UNIT I INTRODUCTION

Business supply chain and logistics– Scope and importance, objectives and drivers.,Key issues and best practices in logistics & SCM, supply chain strategies, performance measurement. Outsourcing- Make vs buy approach, Components and Functions of Logistics Management-Case Study

CO2 UNIT II PLANNING AND MANAGING FLOWS

Planning Networks – Decision making under risk – Decision trees – Decision making under uncertainty. Distribution Network Design – Role - Factors Influencing Options, Value Addition.. Supply Chain Network optimization models., Designing Global Supply Chain Network.-Case Study

CO3 UNIT III MANAGING INVENTORIES AND WAREHOUSING

Inventory—objectives, bullwhip effect, control - Economic Order Quantity Models, Probabilistic inventory models, Risk pooling, Vendor managed inventory, Multi-echelon inventory. Warehousing Functions – Types – Site Selection – Decision Model – Layout Design – Costing – Virtual Warehouse

CO 4 UNIT IV TRANSPORTATION DECISIONS AND PACKAGING

Role of transportation in a supply chain – Drivers, Modes, Measures - Transportation decisions -Strategies for transportation,3PL and 4PL, Vehicle Routing and Scheduling.

Packaging- Design considerations, Material and Cost. Packaging as Unitisation. consumer and Industrial Packaging.-Case Study.-**Case Study - Michelin** NLP 2023 - ULIP- Sustainable Initiatives- Competitive Strategies - Single Window e-Logistics- 6 Rs of Logistics

CO5 UNIT V ROLE OF IT AND CURRENT TRENDS

Supply Chain Integration - Building partnership and trust in SC Value of Information, Logistics information system - Role of IT – Framework for IT adoption. - Business Process Reengineering-ERP and EDI, Supply Chain and CRM, Agile supply chain, Reverse logistics, Green logistics and supply chain.

TOTAL HOURS -45

TEXT BOOKS

1. Paul R. Murphy Jr., Donald Wood, "Contemporary Logistics," Pearson, 12th Edition, 2020.
2. Michael H. Hugos, "Essentials of Supply Chain Management," John Wiley & Sons, 5th Edition, 2020.

REFERENCE BOOKS

1. Sunil Chopra, Peter Meindl, "Supply Chain Management: Strategy, Planning, and Operation," Pearson, 7th Edition, 2021.
2. David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, "Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies," McGraw-Hill Education, 4th Edition, 2018.
3. Martin Christopher, "Logistics & Supply Chain Management," Pearson, 5th Edition, 2020.
4. F. Robert Jacobs, Richard Chase, "Operations and Supply Chain Management: The Core," McGraw-Hill Education, 5th Edition, 2021.
5. Tony Arnold, Stephen Chapman, Lloyd Clive, "Introduction to Materials Management," Pearson, 8th Edition, 2021.

WEB REFERENCES

1. <https://www.michiganstateuniversityonline.com/resources/supply-chain/logistics-fundamental-to-supply-chain-success/>
2. <https://artelogic.net/blog/the-role-of-logistics-in-a-supply-chain-management>
3. <https://www.globaltranz.com/agile-supply-chain/>
4. <https://apuedge.com/information-technology-and-its-impact-on-the-logistics-industry/>

5. <https://www.supplychainbrain.com/blogs/1think-tank/post/30512-six-ways-that-supplychains-are-turning-to-green-solutions>
6. <https://www.supplychaindigital.com/>

MOOC REFERENCES

1. <https://nptel.ac.in/courses/110/106/110106045/>
2. <https://nptel.ac.in/courses/110/108/110108056/>
3. <https://www.coursera.org/learn/supply-chain-logistics>
4. <https://www.edx.org/course/supply-chain-fundamentals>
5. <https://www.udemy.com/course/operations-and-supply-chainmanagement/>

COURSE OUTCOMES

CO No	Course outcomes	Cognitive Level

20MBO301.1	Understand the concepts of business logistics and supply chain	K1
20MBO301.2	Demonstrate the impact of network design decision models of supply chain	K2
20MBO301.3	Evaluate the effectiveness of inventory decisions based on demand and supply	K3
20MBO301.4	Exhibit how transportation decisions affect supply chain and logistics	K3
20MBO301.5	Acquire knowledge about role of IT on logistics and supply chain	K3

CO-PO MAPPING

CO	PO 1	PO 2	PO3	PO4	PO 5	PO6	PO 7	PO8	PO9
20MBO301 .1	1	2	3	2	2	1	-	1	-
20MBO301 .2	2	2	3	1	3	2	2	-	1
20MBO301 .3	-	1	1	3	-		1	1	2

20MBO301 .4	2	3	2	2	2	3	2	2	1
20MBO301 .5	3	1	1	-	1	-	-	1	-

UNIT I

INTRODUCTION

Supply chain management is a way to link major business processes within and across companies into a high-performance business model that drives competitive advantage. Logistics refers to the movement, storage, and flow of goods, services and information inside and outside the organization.

Understanding the logistics industry's central challenges

Increasing transportation costs

Inconsistencies in tracking

Limited visibility of shipments

Fragmented communication

Empty miles

Delivery delays

Extended Warehouse Management (EWM)

Transportation Management (TM)

Logistics management plays a significant role in the success of any company's operations and has a direct impact on its bottom line. More importantly, logistics processes play a big part in customer satisfaction, which is more important than low product costs. Logistics professionals should think of themselves as a customer-facing portion of the company and strive every day to add value for their customers.

The Council of Supply Chain Management defines logistics management as:

“... that part of supply chain management that plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.”

Logistics management is often confused with supply chain management. Supply chain management has broader objectives and actually encompasses logistics management. Supply chain management (SCM) includes inter-enterprise, multi-functional processes that target everything from the supplier's inbound freight to the end consumer. Logistics management (LM) is the more practical, hands-on part of the supply chain where goods are transported into a facility, properly stored, handled and transported out. LM focuses on short-term procedures and SCM is focused on the long-term.

In this whitepaper, you will learn about the development and focal points of logistics management, difficulties companies have within these focal points and the best practices to achieve optimized logistics, which leads to superior customer service.

Making quick, informed decisions can save a company up to 40% on logistics costs, so one of the best practices in LM is to implement a fine-tuned logistics strategy. Since the supply chain is constantly changing, so are logistics processes. Developing and implementing a formal logistics strategy will add flexibility to the decision-making process and increase error-response time. A deliberate strategy will let a company predict service disruptions and know how and when to respond to them to ensure service levels stay at peak performance.

How does a company implement a logistics management strategy? First, assess all logistics functions. Take a look at every part of the organization's logistics management and define how it should work and how it contributes to overall supply chain management goals. Look at each physical part of the logistics process and determine its optimum function. Even after a strategy is applied, continue to

evaluate its success and ask if there are other opportunities. The entire supply chain environment is continually evolving, so logistics roles must be flexible. To design a new strategy or analyze your existing logistics processes, ask and answer these 8 questions:

Do you have a way to handle expedited shipping differently than slower moving shipments? Would it be beneficial to do so?

Is there a plan that defines when an item should be inventoried and when an item should be sent directly to a customer?

Would it be more effective to have a third-party logistics (3PL) company manage some or all aspects of your logistics functions? What financial and service considerations must you take into account before making this decision?

Can your distribution network be improved?

Could a change of carrier or mode save money or improve service in outbound transportation? • Do you carry too much inventory? Too little?

What are your specific customer service goals? Is it easy item returns? Delivery speed? Safety?

What future business operations will affect logistics functions and are you prepared to handle them?

For every business, there are different logistics needs and different ways to evaluate operational success. A static logistics strategy will cause serious harm to customer service and the bottom line. It's detrimental to not benchmark success or direction for improvement. While the logistics environment changes frequently, and the amount of data available for analysis grows, you have to actively strategize in order to stay ahead of the fluctuations to avoid disorder. The only way to do this is to ask questions about your logistics processes, evaluate successes and

inefficiencies, and alter your logistics management strategy to fit your company's changing needs.

Inbound logistics is one of the most overlooked aspects in logistics management. On average, companies can potentially save between 20 – 58% on inbound freight spend. Most companies focus on outbound logistics as this is a low-hanging fruit. There are usually more pressing matters for a business to attend to, and many lack any control over inbound freight. However, to drive significant savings and improve customer service, it is critical to gain control of inbound logistics.

REVERSE LOGISTICS

A well-planned, customized reverse logistics strategy will reduce storage and distribution costs, improve brand reputation, create more sustainable business practices, and satisfy customer demands. Reverse logistics is a type of inbound freight that most companies are losing money on. It's seen as an expensive, complex challenge and many companies avoid managing it. It requires an efficient, sustainable approach to resolve each individual item-level issue. It also requires full support from senior management, which is rarely provided. However, reverse logistics is vital to the customer experience, and it is important that it's managed properly. A good reverse logistics program generates maximum value from each item returned. Returns impact the bottom line. An average retailer's reverse logistics costs for consumer goods are equal to 8.1% of total sales. In some industries, such as book publishing, catalog retailing and greeting cards, over 20% of all products sold are eventually returned to the vendor. Quality and distance traveled determine the backward path of the product and its final form and destination. The longer a product stays in the system, the less valuable it becomes.

And, of course, already damaged goods and packages will get worse being transported again. A time-sensitive category of products, like those with technology components, lose market value with each passing week. It's best practice to minimize the time items spend within the system to ensure maximum reclaimed value. Reverse logistics is important for customer service. 69% of customers think of great customer service as quick resolution of problems. For example, consumers who order clothes online typically order several different sizes and colors of the same item. Then, they'll send back the products that don't fit or aren't the right color. If this process is difficult, they won't order from you again. Good reverse logistics practices, and by extension customer service, include a return shipping label and easy packaging for returns. This encourages future purchases. Not to mention, reverse logistics can reduce environmental waste (and improve your company's waste costs). More and more customers appreciate companies who take social and environmental responsibilities seriously, so implementing green practices can further improve the customer's experience. TMS technology is absolutely necessary for any logistics operation. This software will measure, and report detailed shipping records for inbound and outbound freight, monitor vendor and carrier performance, optimize routing and mode choice, and most importantly, help give you end-to-end visibility of freight movement. Not to mention, a TMS can reduce overall transportation costs by 30%. If implemented and used properly, a TMS is invaluable to your logistics objectives.

6 Types of Supply Chain Strategies

With four top priorities and a long list of industry challenges, you can quickly understand why there are so many different strategies. You never want only minimum cost or maximum robustness. You want a tradeoff between everything.

The good news is that almost every one of the supply chain strategies out there fits into one of the six basic types:

1. Efficient Flow

For products with steady and predictable demand, you want to use a strategy where everything works together and all pieces of the supply chain work at the same speed to deliver the product at the required time to the right place.

Inventory management and demand forecasting are critical, and if done right, your inventory levels are always at the right level. You communicate up and down the network constantly. Vendors are chosen because they collaborate well with everyone in the network, building partnerships up and down the chain. You make enough to stock what customers want.

2. Efficient Cost

This is where you maximize the price at every step. The bottom line is in charge. Go with the low-cost provider, manufacturing, and logistics. Change the design to lower the production cost. Price is number one in your market, so you focus on that at every point. You make as many products as possible at one time to keep costs down, so forecasting is critical.

3. Efficient Speed

Use this agile supply chain strategy when time to market and adding product variation are critical for your industry. Supply chain costs are less important, and the ability to quickly change your product, manufacturing, and shipping dominates

your decision on who to work with. You may work with multiple vendors to optimize scheduling.

4. Responsive to Customization

This approach is the way to go if you have a product that requires customization or customer configuration.

You pick your vendors by their ability to deal with unique, low-volume production. They should use automation and advanced manufacturing to integrate customization efficiently into the manufacturing process. The cost is higher, but customer value is high as well. Standard parts are kept in inventory, so customization is quick.

5. Responsive to Demand Fluctuation

In industries with variable demand, you want a strategy that allows you to speed up or slow down the entire supply chain quickly and efficiently. This strategy often carries more inventory at every step, so you can spool up fast. Your vendors need to be able to work with short lead times.

6. Responsive to Customer Problems

You use this last strategy when customers look to your products to solve their problems. Customer satisfaction is about doing what other providers can not. Demand is unpredictable, but when customers need what you have, they need it now and they need it with unique features. You don't make anything until you know exactly what they want. Design and manufacturing work hand-in-hand. You work with vendors who are fast, responsive and communicate clearly. Instead of

inventory, you build up capacity. This approach maximizes value to specific customers.

RISK VS. REWARD: PROPER IMPLEMENTATION IS KEY

Implementing a TMS is difficult. These systems are expensive, complicated and can be discarded or misused very easily. To get the software's full value, it must be implemented properly. This is risky, but necessary, and the results are numerous. You can't just buy an expensive TMS and expect to start seeing results right away. It takes serious work to implement a TMS. You need full company support, and sometimes even a significant culture change within the organization to start effectively using the software. Many companies fail at implementation for one reason or another. However, there are some areas that can easily produce a return on investment (ROI) when your TMS is still gathering data and employees are still learning how to use it. Here are three things you will use your TMS for to start seeing savings right away.

Increase Usage of Preferred Carriers

Lower Cost Mode Selections

Better Routing

These areas are where most TMS programs excel, and historically, they are the safest target areas during implementation. This is because they are the easiest cost

saving methods to achieve with a TMS, even when it is brand new. An initial focus on these areas can help assure implementation is successful. Implementation can be a risky period. Implement a TMS with the features most relevant to your business needs, do the necessary work up front during implementation and **YOU CAN'T JUST BUY AN EXPENSIVE TMS** and expect to start seeing results right away 9 setups, and you should have no problem seeing ROI and added value to logistics management.

Definition: Logistics management is defined as a set of multiple processes that facilitate the efficient movement of raw materials, goods, parcels, finished products, and freight from their point of origin through to their end-consumer. Depending on the degree of digital adoption within an ecosystem and the stakeholders and companies within it, these processes can be manual or automated. Today's logistics management methods have rapidly adopted new-age technologies like Cloud-Tech, Internet of Things, Artificial and Predictive Intelligence, Machine Learning (etc.). Core activities of logistics management include order fulfillment, warehousing, inventory management, packing, predicting patterns of demand and supply, and fleet and driver management, to name a few. By deploying such powerful tools to manage the logistics function, today's businesses have become empowered – they have been able to identify new revenue streams, improve profitability, and achieve high levels of customer satisfaction. Since logistics form the core of supply-chain management, this has created breakthrough improvements in the overall methods and operational efficiencies achieved by supply chains all over the world. Logistics management is complex and fundamental for companies in managing their supply chain. The key components create and enforce

consistency in the movement of goods from manufacturer to distributor or consumer. It defines the logistics activities within the supply chain.

Having a deep knowledge and understanding of the key components of logistics management is crucial as the industry changes and pushes for faster and more effective logistics to get a product into the hands of the consumer or distributor.

MAKE / BUY Decision

A make-or-buy decision is an act of choosing between manufacturing a product in-house or purchasing it from an external supplier. Make-or-buy decisions, like outsourcing decisions, speak to a comparison of the costs and advantages of producing in-house versus buying it elsewhere. Make versus Buy is a key strategic decision made by a company on whether it should make a product or its components in-house or buy them from a supplier. A Make versus Buy decision requires a rigorous process that considers not only a company's financial factors but also its wider strategy, exploring core competencies, human resources, network and technology solutions, maintenance and flexibility. With third-party suppliers in low-cost regions often offering more competitive pricing and businesses under pressure to reduce their costs, Make versus Buy is becoming a more frequent consideration. However, outsourcing is not always the best option. When evaluating a company's wider operations involved in sourcing the product or

component elsewhere and the potential impact on quality, delivery and customer satisfaction, the decision becomes much more complex.

COMPONENTS AND FUNCTIONS OF LOGISTICS MANAGEMENT

In order to help improve the process, one must dive into the key components. Here are the five major components of logistics management:

- Planning: storage, warehousing, and materials handling
- Packaging and utilization
- Inventory control
- Transportation
- Information and control

Understanding each element of logistics is a simple and effective way to recognize how logistics activities and processes take part in the supply chain. Let's take a close look at each.

1. Planning: Storage, Warehousing, and Materials Handling

The market is unpredictable and highly susceptible to the imbalances between supply and demand. Supply can be steady, but the demand for goods from consumers is not. It is directly affected by different factors, making it unpredictable.

Logistics management plays a key role in ensuring a constant and continuous supply of goods from the manufacturer to the consumer. Great planning becomes essential to maintain a healthy supply chain. During the fluctuation of supply and demand, there can be an insufficient supply of goods or a surplus of goods produced. In such cases, storage units and warehouses become part of the process. Proper logistics planning provides organization and synergy and becomes essential to ensure proper maintenance and handling of the goods. Planning is one of the most important components of Logistics management. It is essential to assuring all elements of the process are coordinated and implemented successfully. It creates systems and processes to achieve timely delivery of products.

2. Packaging Unitisation

Care and conditioning of the products and goods are essential in the supply chain. Proper handling and storing of products is key in logistics management. The packaging of the products takes a lot of research. Analyzing the way the goods are stored to keep them at their best quality, and strategizing how the package itself can be handled and processed is part of the research and strategy. In addition, the colors and branding play a big part to ensure the consumer gets a positive experience.

The design, the shape, the material, and even the colors of the packaging are thought out in order to successfully get the product to the right hands in the best condition possible. Packaging protects a product as it is being transported from the manufacturer to the hands of the consumer or distributor. But when supply and demand fluctuate, that package might need to sit in a warehouse in the process. That goes into the packaging strategy as well. It must maintain and condition the product in such scenarios, without jeopardizing the quality. Unitisation assists in the storage and transportation of goods and products. Essentially, it is a “grouped or bundled cargo, wrapped into packages and loaded onto or inside a bigger unit”. The end goal is to fit products and goods in a cube, the easiest shape to transport and store. Packaging and unitisation work together on packing all different shapes and sizes of products and goods into a cuboid shape.

3. Inventory Control

Inventory is closely related to storage and warehousing and is important to ensure consumer requirements are met. It is about controlling the flow of goods and products going in and out of the warehouses. It determines how much stock to hold, where to store, and how much is to be stored. Inventory management is about predicting the demand of goods by consumers with the help of sales data, mathematical and statistical tools. As previously mentioned, the market varies and can sometimes be unpredictable. Inventory management is not an exact science, but it is an important logistics element to helping manage the flow of goods through the supply chain. A healthy inventory balance is detrimental to the supply chain and business margins.

4. Transportation

Transportation is a complex and costly part of logistics management. It can represent 50 percent of the logistics budget, putting pressure on companies to find the fastest and cost-effective way to get products and goods to the consumers and distributors. Transportation includes various platforms, such as road vehicles, cargo trains, freight shipping, and air transport. Perishables do not travel far, but many other goods travel from all over the world, adding complexity to the process such as tax codes, customs clearance, and payment methods. All of which must be cleared before the products even leave the warehouse. Transportation plays a key role in the fast-growing industry of e-commerce. The consumer has high expectations for fast and proper delivery of goods, and even the return of such. When partnering with a 3PL, it is important to work with a company that provides reliable and transparent logistic services to ensure quality and efficiency.

5. Information and Control

Data-driven logistics drive the future of the industry. The flow of information throughout the logistics management process is vital to providing fast and accurate service to the consumer and manufacturers. From inventory flow to warehouses and transportation, information improves the efficiency and performance of activities in a supply chain. Information and control improve business efficiency helping in the traditional management processes, but also supporting as a modern tool in achieving strategic goals. Analyzing and understanding the five components of logics management thoroughly is a constructive business practice as advances continue to shape the components of logistics management, change the industry, and improve the technologies.

Logistics management is recognized as an essential component of the supply chain since it covers tasks such as planning and managing the delivery of commodities from point of origin to the ultimate destination. It is a component of supply chain management (SCM), which includes product packaging, materials handling, storage, inventory, and other services. As a result, knowing the critical components of logistics management is critical to ensuring the smooth functioning of the overall supply chain activities. A well-planned logistics management strategy is becoming increasingly important for firms as transportation becomes more complex than ever. End-to-end visibility is enabled by an effective flow of communication and goods, which can improve the customer experience.

BEST PRACTICES IN LOGISTICS MANAGEMENT

Key Takeaways

- Internet-based technology is instrumental to better performance.
- Outsourcing to logistics service providers can drive leaps in performance when paired with visibility and control technology.
- Spend management in international logistics is an emerging area of focus.
- Creating organizational buy-in is the most important factor for success.

The Challenges of International Logistics

In most companies, international logistics processes mirror domestic supply chain practices in the 1970s: logistics staff keep their supply chains moving through experience-based problem solving, and insistent phoning and faxing of logistics partners. At nearly two-thirds of companies, spreadsheets, department-built Access database applications, and emails round out the technology portfolio. Many international logistics groups have reached the breaking point, however. As global sourcing and selling increases, so do transactions, partners, and problems to be managed. But budgets don't allow logistics departments to continue throwing people at these issues. The current manual-intensive process of global logistics is becoming unsustainable. Companies adopting automation are starting to experience cost and speed advantages over their competitors. These companies are using automation to tackle both physical distribution challenges and cost control challenges.

Cost Challenges

A parallel issue is cost control. "In our domestic supply chain, we can easily attribute freight costs and even understand the impact of truck fuel surcharges at a carton level," says a retail international transportation director. "But on the international side, we were challenged to answer even basic questions such as, "What's the average ocean freight spent per month, by lane?" Because we lacked integrated systems and normalized data." Companies are finding that inadequate transportation spend visibility is leading to unanticipated budget discrepancies, unexpectedly low product margins, and, in some cases, higher rather than lower total costs when sourcing from low-cost countries.

Implement Transportation Spend Management

A missing discipline in many companies is transportation spend management. Although companies have focused on spend management in areas like office suppliers, travel expenses, and telecom costs, they have mostly ignored ocean and air freight costs. Yet international transportation costs can be two to three times higher than domestic costs and much more variable. Two of the best practice winners focused specifically on aspects of freight spend management to jump-start their improvement initiatives. “Electronic contract management is the foundation for spend management,” explains an international transportation director. “We can exploit this foundation to improve product costing and margin management, automate freight audit processes, and take preemptive action on cost and allocation issues.”

Use Inventory More Effectively

Best practice winners also focus on extracting more value from their inventory. In some cases, this means creating better in-transit visibility so they can redirect inventory around port congestion or other bottlenecks or to higher points of demand. In other instances, the focus is on optimizing where and how much to hold inventory in the first place.

Track Supply Chain Metrics

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

Perfect Order Rate: This measures a supply chain's ability to deliver error-free orders. That means orders that arrive on time, in full, containing the correct items. A perfect order rate has one of the biggest impacts on the bottom line, as it directly affects customer satisfaction and retention. **Warehousing Costs:** This metric is critical for establishing a financially efficient supply chain. It encompasses all of the costs related to warehouse operations, including labor, rent and utilities, equipment, shelving and pallet racks and technology. Supply chain managers should review this KPI regularly and make adjustments as necessary. However, businesses should analyze any cost-cutting on warehousing expenses to understand its impact on other areas of the supply chain.

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

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

Centralize Document Management

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

CASE STUDY

Fantastic Corporation designs and makes a fantastic new home entertainment center with widescreen HD TV and surround sound. It performs to demanding specifications and delivers impressive results. Customer demand is growing steadily, and if Fantastic does not keep up with demand, customers will go elsewhere and competitors will start taking market share. There have been some supply chain problems as Fantastic ramps up production. There are points in the supply chain where products are either running out or building up too much. And now the company has also decided to expand from its North American market into Europe. You are head of supply chain operations at Fantastic and you already run a supply chain that extends from China to New York and points in between as shown in the screenshot below. Now you are going to extend that supply chain to Paris and Berlin. You need to design and execute a strategy to improve operations of the existing supply chain and then expand it to support the new business in Europe.

Your CEO has already described the company's business plan. The company intends to open stores in London, Paris, Amsterdam and Berlin. The CEO wants to enter the most promising European markets quickly, and then be ready to expand into further cities in Europe if prospects look good. Everyone is looking to you to deliver the products those new stores will need. Your existing supply chain has grown up to support Fantastic Company operations and sales in North America and that is the base you will build on to support the company's move into Europe. Factories of suppliers in Japan, China, Vietnam and Singapore manufacture component parts that Fantastic needs to build its home entertainment centers. These parts are shipped (using ocean freight and air freight) across the Pacific

Ocean to facilities in Tacoma and Los Angeles. Further assembly of parts is done in Tacoma, and from there, sent by railroad down to a factory in Los Angeles where final assembly of home entertainment systems happens.

As you work on expanding this supply chain you will get to practice setting up and managing a supply chain that is truly global in scope. As the supply chain grows, product lead times can be much longer than is the case in local or regional supply chains. And when transportation suddenly becomes significantly more expensive or time consuming, it creates a new set of conditions different from those encountered during expansion of a company within a single country. You will need to look into ways to increase the speed and volume of products flowing through the supply chain, while at the same time keeping an eye on costs and managing them so they don't eat up all the profit. You also need to look at managing supply chain lead times by using higher levels of safety stock inventory to ensure that facilities don't run out of inventory. You will see how inventory can easily build up to levels that are beyond what is needed for safety stock and become a significant expense to maintain.

QUESTIONS:

1. How to get the existing supply chain and assembly operations to run for 30 days and keep North American customers supplied with product over a 30 day period?
2. Once you have the existing supply chain running for 30 days, expand the supply chain to support new stores in Europe. How will you prepare for the move into Europe? What steps will you take to support the opening of the initial four European stores?

CASE STUDY

Zara changes its clothing designs every two weeks on average, while competitors change their designs every two or three months. It carries about 11,000 distinct items per year in thousands of stores worldwide compared to competitors that carry 2,000 to 4,000 items per year in their stores. Zara's highly responsive supply chain is central to its business success. The heart of the company and its supply chain is a huge, highly automated distribution center (DC) called "The Cube". The screenshot below shows a close up satellite view of this facility.

Manufacturing and Supply Chain Operations Make Zara Unique in Its Industry

Factories can increase and decrease production quickly, thus there is less inventory in the supply chain and less need to finance that inventory with working capital. They do only 50 – 60 percent of their manufacturing in advance versus the 80 – 90 percent done by competitors. So Zara does not need to place big bets on yearly fashion trends. They can make many smaller bets on short term trends that are

easier to call correctly. The company purchases raw fabric from suppliers in Italy, Spain, Portugal and Greece. And those suppliers deliver within 5 days of orders being placed. Inbound logistics from suppliers are mostly by truck.

The Cube is 464,500 square meters (5 million square feet), and highly automated with underground monorail links to 11 factories within a 16 km (10 mile) radius of the Cube. All raw materials pass through the cube and all finished goods also pass through on their way to stores. The diagram below illustrates Zara's supply chain model.

Questions:

1. How continuous adjustments need to be made to keep the supply working and to keep operating expenses and inventory levels under control.
2. How can Zara make a better supply chain with their customers?

CASE STUDY

S&J Trading Company introduces a global and local supply chain supporting a growing company. The instructor study guide for S&J Trading Company is structured as a sequence of five scenarios to explore different aspects of this supply chain. As the railway network becomes operational again, and expands to link up with previously isolated cities, it is possible to transport people and products quickly and inexpensively. This intermodal transportation network (ship, truck and rail) enables commerce to increase and businesses to grow. You just graduated with an impressive degree in supply chain management and logistics, and this is your opportunity to prove yourself. You joined the family business, S&J Trading. The

family has been in the import/export business for a long time, and they have a way of seeing opportunities early and getting in before everybody else. Angola's economy has a lot of potential, and up until recently it was one of the fastest growing economies in the world.

Then, with the drop in oil prices, it fell on hard times. But it will come back. Your father and uncle spent some time in Angola and opened up a distribution center and three stores. They are looking for you to grow the business and open new facilities. It calls for long hours and lots of perseverance, but the potential rewards are well worth the effort. The company imports products from the United States and Europe and sells this merchandise through its three stores. There are three categories of products imported in quantities large enough to fill a growing number of shipping containers (the categories are: Product A; Product B; and Product C). You track inventory demand and product inventory at the shipping container level. Load the S&J Trading Company supply chain from the online library. In the Edit screen click on the tabs for the four entities and see more about the products, facilities, vehicles and routes that make up this supply chain

Questions: 1. Make changes to the existing supply chain and get it to run for 30 days. Then expand the supply chain to support four new stores.

2. Do some experimentation to find the best way to build a rail-based supply chain

UNIT II

PLANNING AND MANAGING FLOWS

Supply chain network design is like the architectural blueprint of your business's logistics operations. It is the art and science of strategically planning how your products move from suppliers to customers, efficiently and cost-effectively. Supply chain management involves a great deal of diverse information—bills of materials, product data, descriptions and pricing, inventory levels, customer and order information, delivery scheduling, supplier and distributor information, delivery status, commercial documents, title of goods, current cash flow.

Supply Chain is the management of flows. There are Five major flows in any supply chain : product flow, financial flow, information flow, value flow & risk flow.

The product flow includes the movement of goods from a supplier to a customer, as well as any customer returns or service needs. The financial flow consists of credit terms, payment schedules, and consignment and title ownership arrangements. The information flow involves product fact sheets, transmitting orders, schedules, and updating the status of delivery.

THE PRODUCT FLOW

Product Flow includes movement of goods from supplier to consumer (internal as well as external), as well as dealing with customer service needs such as input materials or consumables or services like housekeeping. Product flow also involves returns / rejections (Reverse Flow).

In a typical industry situation, there will be a supplier, manufacturer, distributor, wholesaler, retailer and consumer. The consumer may even be an internal customer in the same organization. For example in a fabrication shop many kinds of raw steel are fabricated into different building components in cutting, general machining, welding centers and then are assembled to order on a flatbed for shipment to a customer. Flow in such a plant is from one process / assembly section to the other having a relationship as a supplier and consumer (internal). Acquisition is taking place at each stage from the previous stage along the entire flow in the supply chain.

In the supply chain the goods and services generally flow downstream (forward) from the source or point of origin to consumer or point of consumption. There is also a backward (or upstream) flow of materials, mainly associated with product returns.

THE FINANCIAL FLOWS

The financial and economic aspect of supply chain management (SCM) shall be considered from two perspectives. First, from the cost and investment perspective

and second aspect based on flow of funds. Costs and investments add on as moving forward in the supply chain. The optimization of total supply chain cost, therefore, contributes directly (and often very significantly) to overall profitability. Similarly, optimization of supply chain investment contributes to the optimisation of return on the capital employed in a company. In a supply chain, from the ultimate consumer of the product back down through the chain there will be flow of funds. Financial funds (Revenues) flow from the final consumer, who is usually the only source of “real” money in a supply chain, back through the other links in the chain (typically retailers, distributors, processors and suppliers).

In any organization, the supply chain has both Accounts Payable (A/P) and Accounts Receivable (A/R) activities and includes payment schedules, credit, and additional financial arrangements – and funds flow in opposite directions: receivables (funds inflow) and payables (funds outflow). The working capital cycle also provides a useful representation of financial flows in a supply chain. Great opportunities and challenges therefore lie ahead in managing financial flows in supply chains. The integrated management of this flow is a key SCM activity, and one which has a direct impact on the cash flow position and profitability of the company.

THE INFORMATION FLOW

Supply chain management involves a great deal of diverse information—bills of materials, product data, descriptions and pricing, inventory levels, customer and order information, delivery scheduling, supplier and distributor information, delivery status, commercial documents, title of goods, current cash flow and

financial information etc.—and it can require a lot of communication and coordination with suppliers, transportation vendors, subcontractors and other parties. Information flows in the supply chain are bidirectional. Faster and better information flow enhances Supply Chain effectiveness and Information Technology (IT) greatly transformed the performance.

THE VALUE FLOW

A supply chain has a series of value creating processes spanning over the entire chain in order to provide added value to the end consumer. At each stage there are physical flows relating to production, distribution; while at each stage, there is some addition of value to the products or services. Even at the retailer stage though the product doesn't get transformed or altered, he is providing value added services like making the product available at convenient places in small lots.

These can be referred to as value chains because as the product moves from one point to another, it gains value. A value chain is a series of interconnected activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various product services), delivery to final customers, and final disposal after use. That is the supply chain is closely interwoven with the value chain. Thus the value chain and supply chain are complementing and supplementing each other. In practice supply chains with value flow are more complex involving more than one chain and these channels can be more than one originating supply point and final point of consumption. In chains at each such activity there are costs, revenues, and asset values are assigned. Either through

controlling / regulating cost drivers better than before or better than competitors or by reconfiguring the value chain, sustainable competitive advantage is achieved.

THE FLOW OF RISK

Risks in the supply chain are due to various uncertain elements broadly covered under demand, supply, price, lead time, etc. Supply chain risk is a potential occurrence of an incident or failure to seize opportunities of supplying the customer in which its outcomes result in financial loss for the whole supply chain. Risks therefore can appear as any kind of disruptions, price volatility, and poor perceived quality of the product or service, process / internal quality failures, deficiency of physical infrastructure, natural disaster or any event damaging the reputation of the firm. Risk factors also include cash flow constraints, inventory financing and delayed cash payment. Risks can be external or internal and move either way with product or financial or information or value flow.

External risks can be driven by events either upstream or downstream in the supply chain

- Demand risks – related to unpredictable or misunderstood customer or end-customer demand.
- Supply risks – related to any disturbances to the flow of product within your supply chain.
- Environment risks – that originate from shocks outside the supply chain.
- Business risks – related to factors such as suppliers' financial or management stability.

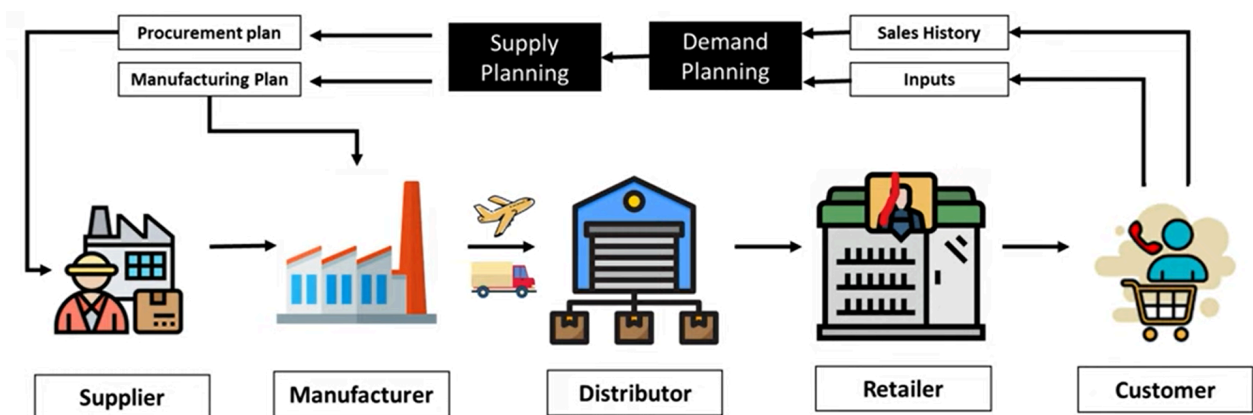
- Physical risks – related to the condition of a supplier’s physical facilities.

Internal risks are driven by events within company control:

- Manufacturing risks – caused by disruptions of internal operations or processes.
- Business risks – caused by changes in key personnel, management, reporting structures, or business processes.
- Planning and control risks – caused by inadequate assessment and planning, and ineffective management.
- Mitigation and contingency risks – caused by not putting in place contingencies.

SCOR MODEL

SUPPLY CHAIN OPERATIONS REFERENCE



SCOR	Activities	Roles
PLAN	Demand Planning, Supply Planning	Demand Planner, Supply Planner.
SOURCE	Sourcing from Supplier	Buyer, Purchaser
MAKE	Manufacturing	Production Planner, Scheduler, Inventory Planner
DELIVER	Transportation, Warehousing	Transportation Planner, Warehouse Executives, Logistics Planner
RETURN	Return Order Management	Customer Service, Sales Representatives.



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INTEGRATION OF FLOWS IN SUPPLY CHAIN

Supply chain management integrates key business processes from end user through original suppliers, manufacturer, trading, and third-party logistics partners in a supply chain. Integration is a critical success factor in a dynamic market environment and is prerequisite for enhancing value in the system and for effective performance of the supply chain by sharing and utilization of resources, assets, facilities, processes; sharing of information, knowledge, systems between different tiers in the chain and is vital for the success of each chain in improving lead-times,

process execution efficiencies and costs, quality of the process, inventory costs, and information transfer in a supply chain. Integration leads to better collaboration for synchronized production scheduling, collaborative product development, collaborative demand and logistic planning. Also with increased information visibility and relevant operational knowledge and data exchange, integrated supply chain partners can be more responsive to volatile demand resulting from frequent changes in competition, technology, regulations etc. (capacity for flexibility). Integration is required not only for economic benefits but also for compliances in terms of social and community, diversity, environment, ethics, financial responsibility, human rights, safety, organizational policies, industry code of conduct, various national / international laws, regulations, standards and issues.

Value addition in supply chain management refers to increasing the value of a product or service through the various supply chain stages, from procurement to delivery to the end customer. A 'supply chain' refers to the system and resources required to move a product or service from supplier to customer. The 'value chain' concept builds on this to also consider the manner in which value is added along the chain, both to the product / service and the actors involved.

Distribution network design

It involves decisions regarding inventory levels and where to store products. Striking a balance between having enough inventory to meet demand without excessive holding costs is crucial, considering factors such as demand fluctuations and order quantities.

Changing the distribution network design affects the following supply chain costs:

- Inventories

- Transportation
- Facilities and handling
- Information

There are two key decisions when designing a distribution network:

1. Will product be delivered to the customer location or picked up from a preordained site?
2. Will product flow through an intermediary (or intermediate location)?

Based on the choices for the two decisions, there are six distinct distribution network designs that are classified as follows:

1. Manufacturer storage with direct shipping
2. Manufacturer storage with direct shipping and in-transit merge
3. Distributor storage with package carrier delivery
4. Distributor storage with last mile delivery
5. Manufacturer / distributor storage with customer pickup
6. Retail storage with customer pickup

A manufacturer storage network is likely to have difficulty handling returns, hurting customer satisfaction. The handling of returns is more expensive under drop shipping because each order may involve shipments from more than one manufacturer. There are two ways that returns can be handled. One is for the customer to return the product directly to the manufacturer. The second approach is for the retailer to set up a separate facility (across all manufacturers) to handle returns. The first approach incurs high transportation and coordination cost while the second approach requires investment in a facility to handle returns.

Supply Chain Network Optimization Models

Supply chain network optimization seeks to find an optimal combination of factories and distribution centers in the supply chain. The solution should match supply and demand, as well as find a network configuration with the lowest costs. Based on the optimization results, a manager can compare potential network designs and evaluate the maximum profitability of each of them.

BUSINESS CONSTRAINTS IN NETWORK OPTIMIZATION

In real life, companies may have specific requirements that are essential for their businesses. These requirements should be taken into account in the supply chain network optimization as **constraints**. Constraints could be, for example, a limited amount of facilities, or step costs (fixed within certain boundaries).

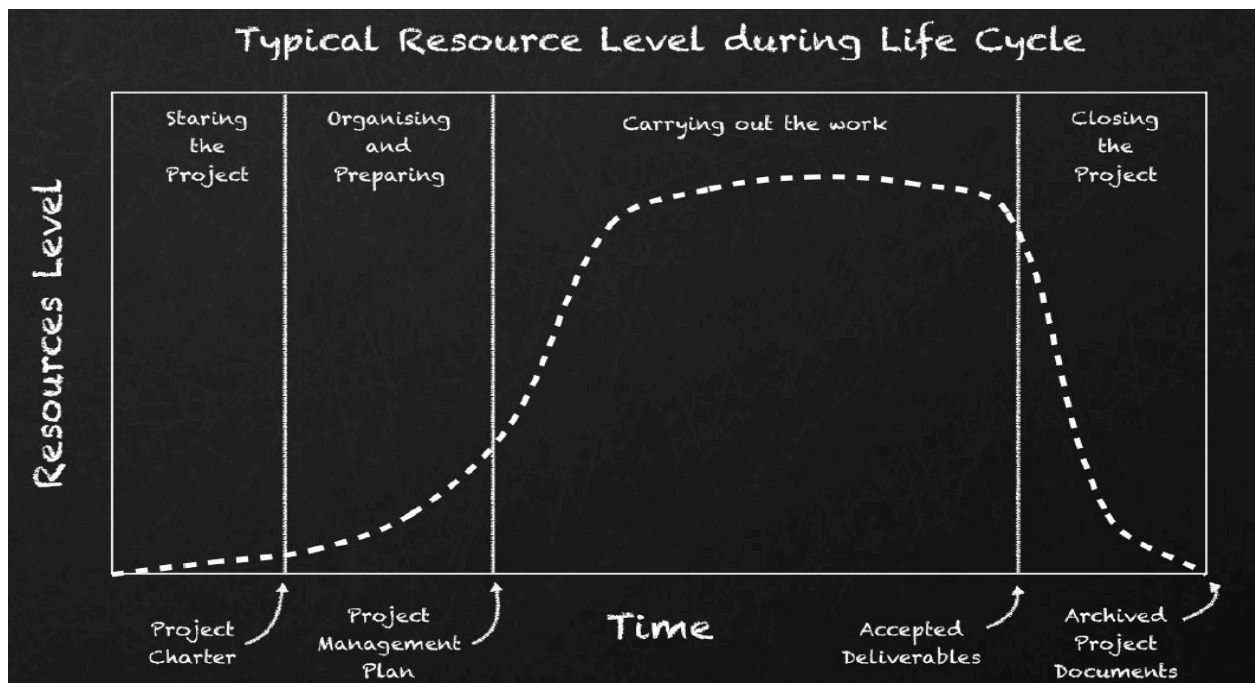
In anyLogistix, constraints help the software decide which solutions would be feasible. When setting the parameters for the network optimization experiment, you can choose values for:

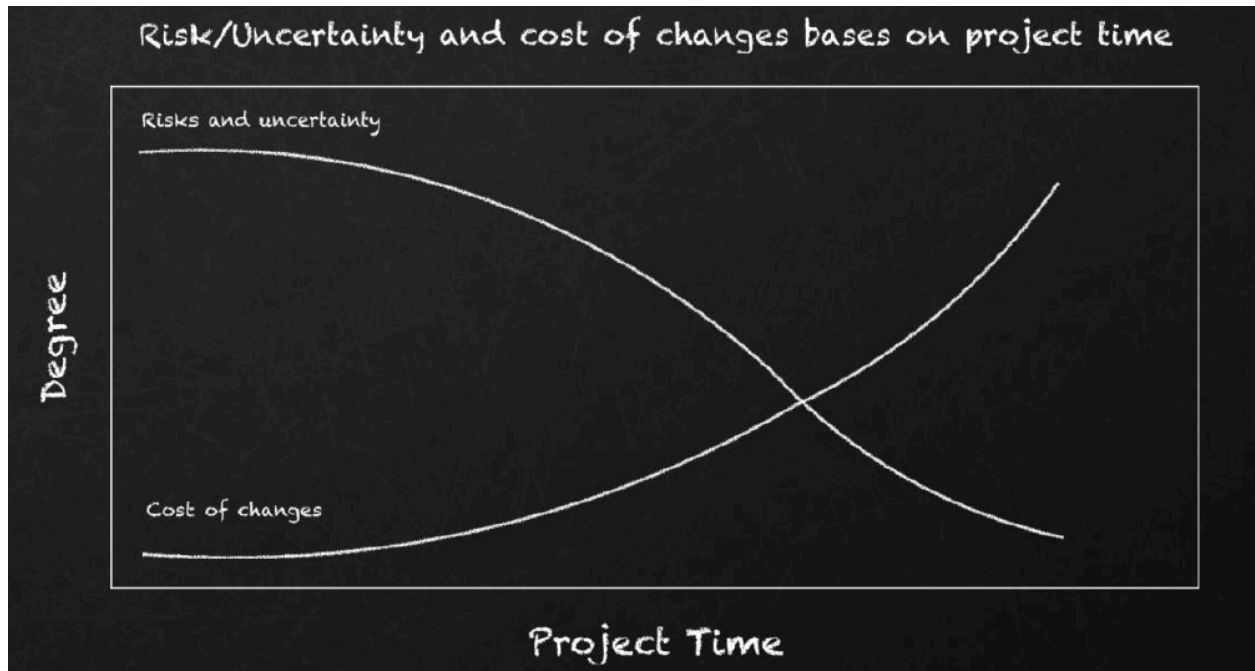
- Demand constraints
- Product flow constraints
- Stock capacity constraints
- Production constraints

However, it is not always possible to get an optimal result that complies with all of the requirements. If the strict operation rules you've set for the supply chain are controversial, no solver will be able to find a solution. In this case, think about

changing some of the **hard constraints** into **soft**. This means that you allow disregarding some of the rules you have set

https://docs.google.com/file/d/1HaUoSgKiR0QWvRML4k2aimzCqwSOLooI/edit?usp=doclist_api&filetype=mspresentation





UNIT III - MANAGING INVENTORIES AND WAREHOUSING

Inventory—objectives, bullwhip effect, control - Economic Order Quantity Models, Probabilistic inventory models, Risk pooling, Vendor managed inventory, Multi-echelon inventory. Warehousing Functions – Types – Site Selection – Decision Model – Layout Design – Costing – Virtual Warehouse

The bullwhip effect is a supply chain phenomenon where small fluctuations in demand can cause larger and more devastating ripples up the supply chain. This

happens when orders to suppliers vary more than sales to buyers, which amplifies demand variability upstream

The bullwhip effect can lead to a number of problems, including:

- Excessive inventory investment
- Poor customer service
- Lost revenues
- Misguided capacity plans
- Ineffective transportation
- Missed production schedules

In a supply chain, the bullwhip effect occurs when each party gradually escalates an initially small spike in demand. Each member of the supply chain overcompensates for this demand with excess product, leading to increased production, inaccurate demand forecasting, and inconsistent inventories. The bullwhip effect can result in costly delays in the supply chain, understocking or overstocking, the inability to meet consumer demand, and much more. The impact of the bullwhip effect can be mitigated by increasing visibility throughout the supply chain.

Probabilistic inventory models consisting of probabilistic supply and demand are more suitable in most circumstances. Two methods are used based on the frequency of order placement for procuring inventory stock, these are single period and multi-period inventory systems

Economic order quantity (EOQ) is the ideal quantity of units a company should purchase to meet demand while minimizing inventory costs such as holding costs, shortage costs, and order costs.

Warehouses serve many functions, including:

Storage: Warehouses store goods, inventory, and equipment.

Movement: Warehouses are the main hub for receiving and sending out goods.

Processing: Warehouses can perform value-added services on products, such as labeling, repackaging, and quality checking.

Inventory management: Warehouses track and organize products and shipments.

Quality control: Warehouses perform quality control on raw materials and finished goods.

Price stabilization: Warehouses help control price fluctuations by storing goods when supply exceeds demand and releasing inventory when demand increases.

Organization: Warehouses help businesses organize their goods.

Labor management: Warehouses can help businesses understand their labor needs through efficient tracking systems.

Security: Warehouses can help companies secure their goods.

Multi-echelon inventory optimization (MEIO) is a method of managing inventory across multiple levels of a supply chain to improve efficiency and reduce costs.

MEIO can help companies:

Improve service levels: MEIO can help companies meet demand and provide targeted service levels.

Reduce costs: MEIO can help companies reduce costs across the supply chain.

Improve agility: MEIO can help companies maintain agility by taking into account factors like seasonality, demand, and supplier lead times.

Manage demand and supply fluctuations: MEIO can help companies manage demand and supply fluctuations.

MEIO works by analyzing the entire supply chain network and using analytics to determine the right inventory levels at each stage. This is different from traditional inventory optimization, which optimizes each level of the supply chain independently.

Some things to consider when implementing MEIO include:

Demand forecasting: Accurate demand forecasting is important for an effective MEIO strategy.

Supply chain structure: MEIO requires a well-structured supply chain network that includes optimized supplier collaboration.

Model types: There are different types of MEIO models, including stochastic and hybrid models. Stochastic models are more complex but can provide a more realistic approach. Hybrid models combine elements of both deterministic and stochastic models.

Selecting the perfect warehouse location is a multifaceted endeavor that goes far beyond typical space considerations. Whether you're embarking on a lease agreement or making a long-term investment in a property, warehouse site selection is a critical component of your company's competitive advantage. A comprehensive supply chain model encompasses all possible flows and facilities. Additionally, it will present various network configuration options, highlighting

those with the lowest costs, enabling you to select the most suitable one for your business needs.

At Hughes Marino, we have identified five critical factors to consider when performing a site selection analysis to identify the right industrial warehouse for your business. Proximity to suppliers and customers, consideration of access to transportation networks, the regions availability of a skilled workforce, and real estate costs and availability must all be considered.

Proximity to Suppliers and Customers

Choosing a location that is strategically positioned near your suppliers and customers can yield significant benefits in terms of reducing transportation costs, improving delivery times and fostering stronger relationships with key stakeholders.

A warehouse's location impacts a business' success across a number of measures—and one of the key considerations is the proximity to a business' customer base and suppliers. In the era of instant gratification, which has driven

the need for next-day delivery, customers expect fast turnaround on orders, and meeting those expectations requires strategic planning when it comes to selecting a warehouse location. Time and transportation requirements will drive up costs as well—so decisions around location need to consider the ease with which goods can be transported in and out. If goods are typically being moved via ship, a port-adjacent warehouse may be ideal. For businesses delivering goods and fulfilling online orders to inland markets, proximity to a major parcel transit hub like the Memphis Intermodal Facility or DFW International Airport will streamline operations. Other considerations that can impact shipping times include proximity to carriers with terminals and, if that’s not possible, easy access to major highways. As part of this consideration, a business should make sure to take into account the local weather patterns and risk of natural disasters, and how those events will impact operations and their ability to deliver on-time.

Workforce Availability and Labor Costs

A skilled and reliable workforce is critical for the smooth operation of any warehouse facility. Assessing local labor market dynamics, including availability, skills and associated labor costs can help ensure that your staffing needs are adequately met.

Understanding the warehouse’s workforce needs and ensuring that it is located in a market with a high number of skilled job candidates is key to a business’ long-term success. A state-of-the-art facility is of no value if there is nobody operating within its walls. Infill locations will ensure a larger local talent pool and proximity to transportation hubs, but typically demand increased rental rates, often time for older less superior product. It’s important to note that it’s increasingly challenging for businesses to find and retain skilled warehouse employees, especially since Covid, requiring not only considerations around location but also a willingness to offer competitive wages and other perks—including flexible schedules and benefits. If locating further from an urban center is the best option to reduce lease costs, businesses must consider how they will get workers to the site—and can look into employee perks such as public transportation allowances or commute rebates.

Access to Transportation Networks

Efficient access to transportation networks, including highways, railways, airports and ports, is essential for facilitating the smooth flow of goods in and out of your warehouse. Evaluating factors such as traffic flow, transportation costs and proximity to major hubs can help optimize logistics operations.

Understanding the geographical distribution of your customer base and suppliers can help optimize inventory management and distribution strategies. Accessibility to transportation infrastructure, including roads and highways, is crucial for ensuring efficient inbound and outbound logistics. Factors such as traffic density, congestion patterns and road quality should be carefully evaluated to minimize transportation costs and delivery delays.

Real Estate Costs

Real estate costs vary widely depending on factors such as location, property size, age and market demand. With high-cost, port-close markets like Los Angeles commanding higher rates, your team can consider more outskirt markets with newer and improved warehouses like the Inland Empire.

In practice, companies often have specific requirements that must be considered as constraints in the supply chain network optimization process. These constraints can include limitations on the number of facilities or annual step costs that remain fixed within certain ranges. Intentional supply chain network optimization aims to identify the best combination of factories and distribution centers to efficiently meet supply and demand while minimizing costs.

It's also important for companies to consider the potential government incentives and tax credits available to new entrants to a market. Many states will offer hefty incentives to lure a business across state lines. These incentives can be significant and in many cases the state will not only offer tax credits, but sometimes they will even source the land and fund the construction of facilities.

Conducting thorough research and financial analysis can help identify cost-effective options that align with your budget and operational requirements. Comparing buildings and different markets from a total cost perspective helps accounts for the hidden costs, such as inventory and franchise taxes, as well as incentives that can offset those costs, including local tax benefits designed to attract new businesses.

Building Availability and Expandability

Ultimately, a warehouse is a critical part of a business' long-term strategy. If there are plans to expand and grow in the near future, it's important that the warehouse can accommodate that growth. Businesses need to have a plan for their next phase. If expansion isn't possible on-site, for instance, they can ensure that there's

alternative space nearby to accommodate growth, so that if moving is necessary, the business can retain its workforce and make a smooth transition.

The ability to scale your business over time is directly impacted by the availability of suitable buildings. For instance, securing a facility in a prime location can enhance proximity to both customers and suppliers, optimizing operations.

However, envisioning the future, imagine your operations doubling in five years, necessitating additional warehouse space. If your initial warehouse choice was in a highly competitive area with no available expansions, significant logistical challenges arise, requiring a complete reevaluation of location selection. This isn't to dissuade from competitive market choices, but rather to underscore the importance of considering long-term implications in warehouse site selection.

Depending on your business's import/export requirements, proximity to transportation hubs such as airports, railway stations and ports may be advantageous. Additionally, operating within a foreign trade zone (FTZ) can provide benefits such as duty deferral, tariff relief and streamlined customs procedures

Warehouse Site Selection Dos and Don'ts

Companies must use a myriad of criteria when selecting a warehouse and distribution site, and real estate's geographical location is just one small part of the overall evaluation. Incentives, labor, logistics, and available resources all factor into site selection decisions, and everything depends on a company's specific goals and priorities.

In today's market, companies face increasing rents, delayed builds, rising land costs, and a lack of capacity. The Covid pandemic, the Ukrainian war, rapidly increasing fuel prices and ongoing supply chain challenges are driving existential supply chain challenges, and changing economic factors are leading to shifting transportation and storage demands. To succeed in the current environment, many companies are investing in long- and short-term strategies to secure the space they need today and in the future.

“Across the country, modern bulk distribution building inventory is very limited, mainly brought on by Covid because construction wasn't happening,” said Bryan Gardner, SIOR, McIntyre Real Estate Services. “In 2023, we see more inventory coming on the market, but we're in a gap right now.”

Finding space is especially challenging for smaller operations as vacancy rates hit all-time lows. “The big boxes are leaving holes for those companies seeking 50,000 square feet or less,” Gardner said.

One of the most significant issues facing the supply chain industry is the rising cost of rent for warehouse and distribution center space. Prologis reported that a sustained high consumer demand along with new project delays have kept supply tight. In the first quarter of 2022, rents rose 41.5 percent in the U.S., and Prologis is forecasting U.S. market rents to increase 22 percent this year.

Finding the Best Location

A location’s needs can vary based on customer demands. When getting to know a customer and the customer’s needs, Fred Schmidt, chief operating officer of GeoEconomic Institute, a member of The MetaResource Group and an affiliate of RV3 Solutions, asks a series of questions about labor, logistics and priorities. “You’re asking questions all around the continuum,” he said.

According to Jim Reeb, chief impact officer of GeoEconomic Institute, every customer has different needs. “E-commerce is different than business-to-business. There are tradeoffs with cost and service levels, and there are multiple supply chain strategies,” he said. “Inventory optimization by product line and customer segment is key, and it is all data analytics.”

There can be conflicting priorities within an organization depending on the department. “Their metrics are different, so their agenda is different. As advisors, we have to define a consensus among them. That is only done through data-driven decisions,” Reeb said. “You drive down into a network analysis, which allows us to have a consensus among the marketing, operating, finance, and brand managers.”

Understanding a company’s needs as well as its customers is critical. “Some companies are serving an internal or external customer. We have to understand what constituencies they are serving and how they are going out into the marketplace,” Schmidt said.

Added Reeb, “We craft the data behind the alternative scenarios that will allow them to pick the best strategy.”

Taking a Macro View of Site Selection Criteria

When examining the best location for a warehouse and distribution center, a site's strengths and weaknesses are dependent on macro and micro trends.

Inventory Management

Consumer demands have been erratic, contributing to rapidly changing inventory needs. To help meet demand, some companies are building buffer inventory, increasing their stock of raw materials and buffering finished goods.

“Demand for inventory buffer is a classic risk management tool and that is not going away. Consumer demand, weather, political changes, and natural phenomena all create concerns,” Reeb said. “Nobody knows what the future is going to be. When you don't know what the future will hold, you put products in a storage facility.”

The cost of inventory is critical. “If you have too many locations, it can be too high,” Schmidt said. “Each industry has its set of variables and each of the variables have a different model. E-commerce is different than pallet based and truckload.”

However, not every facility or product category has the same needs. “The real estate industry often jumps on trends and says all things get painted with the same brush, but if you look at a particular product, its lifecycle and its demand, it will tell you if demand is regional or consolidated,” Reeb explained, adding that some inventory, such as medical supplies, needs to be regional, while other inventory is best managed in aggregate. “As service level performance goes up you have to be more regionally focused.”

Consumer Expectations

With business-to-consumer shipments, speed can be a priority. Consumers increasingly expect rapid shipments. Some companies are decentralizing their distribution centers and warehouse locations to facilitate two-day, next-day or even same-day shipping in major markets.

Near Shoring

One macro trend influencing whether inventory is centralized or decentralized is the reshoring and onshoring of production in North America, Schmidt said.

In the 2022 26th Annual Third-Party Logistics Study, 62% of shippers said they believe that supply chains have become too lean, taking out too much in an effort to reduce cost and on-hand inventory. Similarly, 68% of shippers believe that supply chains have become too global and must be rebalanced towards more regional and local/domestic ecosystems within larger global enterprises.

As companies shift operations closer to home, distribution and warehousing needs change. “We’re going to evolve into a trading block,” Schmidt said. “How does that manifest itself to facilities? We will see it accelerate.”

Labor Needs

Real estate costs are just one part of the equation. Expenses associated with human capital and technology also come into play. When selecting a site, companies must

factor in the available workforce, now and in the future. Additionally, companies need to look at general wages, the cost of living and the price of housing, which is a major driver. “You take the average household wage of the person with the skills you’re looking to hire and multiply that by three or four. If you can’t buy a house of reasonable quality for that amount, you don’t go there,” Reeb said.

Labor issues also factor into a company’s overall approach. “Every single client is going to ask about labor and environmental, social governance”, Schmidt explained. “Those are just as important as the hard assets as well for many companies now.”

Social determinants of health—conditions in the places where people live, learn, work, and play—are a growing factor, especially as companies grow increasingly interested in environmental, social, and governance (ESG). “Every company we work with is being ranked on the ESG index,” Reeb said.

Sustainability is a growing priority for investors, employees, consumers and the public, and companies are adopting initiatives to support their ESG goals. The 26th Annual Third-Party Logistics Study reported that among shippers, 59% said their

organization had an ESG program with defined goals and objectives, and 45% of 3PL providers said their organization had an established ESG program.

The relevance, importance and commitment to sustainability is evident among many organizations throughout the world, and for many organizations, that starts with its people. Companies are increasingly valuing diversity, equity, and inclusion along with work-life balance and fair labor practices.

“When you get into that, you have the vice president of human resources coming into the mix. They’re looking at various factors, such as the drug utilization in the community,” Reeb said. “Every company we work with is being ranked on the ESG index.”

Reeb said turnover can be detrimental to a facility. “If you go to the wrong location, labor will kill you in three years. Labor will trump real estate costs.”

If a location lacks enough labor to meet demand, facilities could add more automation, but that takes increased capital. “It isn’t about optimizing any one component of cost of goods sold. It is about optimizing the entire solution,” Schmidt said. “You have to run multiple models sequentially.”

Examining Microtrends

Microtrends within a region also factor into site selection. “A state’s political environment and state and local tax issues contribute to decision-making. Moreover, incentives aren’t always the primary driver but can reduce the weighted cost of capital, making a location more appealing”, Reeb explained. “That can help reduce a capital investment,” Schmidt said.

Proximity to suppliers, customers, and logistics hubs is a determining factor as well. Facilities positioned next to major interstates or shipping centers can cut costs and improve shipping speeds. Seeing that proximity is easier than ever with Google Earth, and Reeb said much of the selection process has gone virtual and occurs digitally. “Google Earth is a great way to tour. Clients can look at properties and make decisions quickly,” he said, adding that about 80% of the site selection process is done digitally now.

Utility costs and availability in a particular region also factor into overall site selection. Availability of water as well as electric costs vary from site to site and are a major factor for competing locations.

Combining a Short- and Long-term Approach

Given all the challenges associated with available warehouse and distribution space, many companies embrace a short- and long-term approach to their space needs. “It is challenging to forecast right now given the current wave of change,” Schmidt said. “There is no simple answer.”

Because space, including land, is at a premium, companies opting for new, build-to-suit construction must account for labor and construction challenges. “The availability of supplies and labor in addition to traditional approvals factor into scheduling. Almost everything is delayed right now,” Schmidt said.

For some companies, two-to-three-year planning horizons are needed. “Most of our projects need a year to a year-and-a-half before somebody makes a decision,” Reeb said.

Schmidt foresees the adaptive re-use of obsolete sites. “The land cost is comparable to what office space used to be in New York,” he said.

Companies are increasingly turning to third-party logistics providers. “They’re using 3PL locations because they have existing capacity and flexibility,” Reeb said.

Gardner added that 3PLs have done all the work to build facilities in locations that can reach U.S. population in an efficient manner. They also offer the ability for shippers to share space and labor, which can help keep costs down.

3PLs can also help maximize the space within existing warehouse facilities to create a better, more efficient layout for multi-level fulfillment pick operations.

Technology, including wearable devices, robots and other warehouse automation, can improve warehouse efficiency to increase efficiency.

Site Selection: Selecting the Right Strategy

Choosing a warehouse or distribution center location requires extensive research, planning and consideration of macro and microtrends. 3PLs like ITS Logistics continue to invest in new facilities and capacity, customized technology solutions, and their team members have years of expertise in every type of fulfillment services and distribution services, drayage and intermodal services, dedicated fleet services for full omnichannel supply chain solutions.

WAREHOUSE SOLUTION DESIGN

The Warehouse Consultant is expected to do the following list of things and submit as a report in the same sequence; The key requirement is each and every design parameter have to be backed with data and it has to be clearly explained in your report:

Based on the Sales data & trend, estimate the Maximum quantity of stock that must be stored for each Product (SKU). Consolidate and report the maximum number of pairs to be kept in stock; Basis that calculate the total Inventory cost. Maximum Storage quantities & cost must be estimated for a service fill % of 95% and 99.5% and a comparison table / graph must be made.

Estimate the Maximum Quantity of Stock & Inventory cost for 2 Years from now considering a Sales growth of 25% YOY in quantity for the fast-moving SKUs and the rest of the SKUs grow by 5% YOY in quantity. The service fill would be 95%.

Calculate the Storage area in Square Feet needed in the warehouse based on:

maximum stock to be stored by 2 Years from now

service fill of 95%

use other relevant information like the warehouse specifications etc from the KEY INFORMATION section

Note: As a consultant, take a decision on the type of storage, material handling equipment, aisle size, storage method, retrieval method, material handling, such that the operations is optimized (Space utilization vs operation efficiency vs capital requirement). You need to document the various options you have tried with clear representation of storage structure and material flow in a diagram using images or vector; for each option – estimate the storage space required, type of equipment

and quantity, and capital requirement. Then, tell the option which you have selected and why.

The maximum number of lines (Inbound + Outbound) that are processed in a day can be arrived at from the sale data and the Inbound shipment details from the KEY INFORMATION section; considering the sales growth projection for next two years, estimate the lines that must be processed in a day.

Basis that,

Estimate the processing area in square feet needed for Inbound and Outbound (to be estimated for each activity as well); ensure you factor in all the space needed for seamless operations which includes work stations, storage, aisles for movement etc. (Refer KEY INFORMATION Section)

Hesol Footwear operations have returns of 2% and these stocks stay in the warehouse for a maximum of 15 days before they are liquidated in bulk. Basis that estimate the space needed in square feet for the Returns.

For the Current operations, Calculate the number of people needed for Inbound, Inventory, Outbound and other activities. Also, estimate the management staff needed. Accordingly decide on the size of the Office in square feet.

Considering all the areas calculated till now, estimate the total size of the warehouse needed in Square feet.

Hesol has 4 delivery cut offs in a day – 10am, 12am, 2pm and 4pm and mostly the load is even. The customers spread is as follows – 40% of daily deliveries are within 15 Kilometres from the Warehouse, 40% are within 16-30 Kilometres and rest are within 50 Kilometres. Considering this decide –

Number of docks required for Inbound and Outbound.

Type of Trucks that should be hired for deliveries. Document the number of boxes per cut off, volume and weight of the shipment in each cut off... basis that decide on the ideal Trucks.

Draw a block layout of the warehouse showing the size of the warehouse, areas for specific activities as calculated and the material flow. Detail the layout with vectors representing the activities, storages, people, workstations, dock etc.

Submit a CAPEX & OPEX for the Facility Start-up.

KEY INFORMATION

Following are the key information & protocols which must be considered / followed during the solution design:

The footwear is stored in a standard box and the dimensions of the box is 30cm length x 15cm width x 20cm height. While storing the box is always rested with the Length and Width dimension down.

Weight of each pair of footwear with the box is 150g.

The Individual boxes can be stacked only up-to 5 High i.e., 5 Boxes stacked one over another.

The shape of the warehouse is rectangular; Warehouse length to width ratio is 4:1; The docks of the warehouse are on the length side only. Usable Height of the Warehouse is 16 Feet.

Hesol's Operations is a Piece in Piece out operations i.e., Footwear comes in boxes and goes out in boxes. Each box contains one pair of footwear.

Supplier will not palletize the product at any cost and we cannot ship products palletized. This should not be violated in the design but within the warehouse, you can choose to palletize if that is the optimum solution.

The products are stored in the warehouse with one product in one location; no two products will be stored in a single location, but single product can occupy multiple locations. Location means a position in a shelf or a position in a rack or a bin or a floor location etc.

Hesol has a supply lead time of 15-18 days and demand variability of 20% for their fast-moving products (SKUs) and a demand variability of 10% for rest of the SKUs. The fast-moving SKUs are the top 20% of the products which have the maximum sales by quantity.

Hesol warehouse operates for 9 hours in a day with working time of 8 hours. The time window available for Inbound is 6 hours and outbound is 4 hours

Inbound shipment comes once every week to the warehouse. Inbound Quality check is done for 20% of the Products in the shipment.

Hesol's Warehouse activities and the cycle time for each box are as below; Just to keep the case a bit simpler, no matter what type of material flow and handling equipment you select, we assume the cycle time remain the same. But you are free to change mode of operations as per the material handling equipment and storage structure you select.

A virtual warehouse can refer to a compute cluster or a digital representation of inventory:

Compute cluster

A virtual warehouse is a compute cluster that provides on-demand resources for data warehouses. It's an independent resource that can be used for SQL execution and data manipulation language (DML). Virtual warehouses can be started and stopped at any time, and can be set to automatically resume or suspend based on activity.

Digital inventory representation

A virtual warehouse can also refer to a digital representation of inventory that's stored in physical warehouses or storage facilities. This allows businesses to manage their entire inventory, even if it's stored in multiple physical locations. Virtual warehouses can provide real-time analytics and insights to help optimize inventory operations

UNIT IV TRANSPORTATION DECISIONS AND PACKAGING

Role of transportation in a supply chain – Drivers, Modes, Measures -
Transportation decisions -Strategies for transportation,3PL and 4PL, Vehicle
Routing and Scheduling.

Packaging- Design considerations, Material and Cost. Packaging as Unitisation. consumer and Industrial Packaging.-Case Study.-**Case Study - Michelin** NLP 2023 - ULIP- Sustainable Initiatives- Competitive Strategies - Single Window e-Logistics- 6 Rs of Logistics

Transportation is the metal link that holds the supply chain together. Every step of the process is connected together through transportation, since raw materials are moved from the dealers or where they are purchased from, to the place where they are manufactured, and finally to the end customer.

A transportation management system (TMS) is a logistics platform that uses technology to help businesses plan, execute, and optimize the physical movement of goods, both incoming and outgoing, and making sure the shipment is compliant, proper documentation is available.

A 3PL focuses on order fulfillment, which includes warehousing, picking and packing orders, and shipping packages. A 4PL takes it a step further by managing the entire supply chain, including fulfillment, transportation, and technology.

Inventory management

A 4PL provider can use real-time inventory tracking and advanced forecasting techniques to maintain optimal inventory levels. They can also use data analytics to predict demand patterns, plan for seasonality, and account for market trends.

Supply chain optimization

A 3PL provider can help manage inventory levels at each stage in your warehouse.

A 4PL provider can offer strategic guidance on improving processes.

Distribution

A 3PL provider handles the transportation, storage, and distribution of your inventory. A 4PL provider manages the entire logistics operation, from strategic choices to legal documentation to operations execution.

Coordination of suppliers

A 4PL provider can be beneficial if you require extensive supply chain oversight, strategic sourcing, and multiple 3PL coordination.

Access to expertise

A 4PL provider can provide guidance and recommendations on logistics best practices, and identify areas for improvement in the organization's logistics operations.

1PL – First-Party Logistics

An enterprise that sends goods or products from one location to another is a 1PL. For example, a local farm that transports eggs directly to a grocery store for sale is a 1PL.

2PL – Second-Party Logistics

An enterprise that owns assets such as vehicles or planes to transport products from one location to another is a 2PL. That same local farm might hire a 2PL to transport their eggs from the farm to the grocery store.

3PL – Third-Party Logistics

In a 3PL model, an enterprise maintains management oversight, but outsources operations of transportation and logistics to a provider who may subcontract out some or all of the execution. Additional services may be performed such as crating, boxing and packaging to add value to the supply chain. In our farm-to-grocery store example, a 3PL may be responsible for packing the eggs in cartons in addition to moving the eggs from the farm to the grocery store.

4PL – Fourth-Party Logistics

In a 4PL model, an enterprise outsources management of logistics activities as well as the execution across the supply chain. The 4PL provider typically offers more strategic insight and management over the enterprise's supply chain. A manufacturer will use a 4PL to essentially outsource its entire logistics operations. In this case, the 4PL may manage the communication with the farmer to produce more eggs as the grocery store's inventory decreases.

5PL – Fifth-Party Logistics

A 5PL provider supplies innovative logistics solutions and develops an optimum supply chain network. 5PL providers seek to gain efficiencies and increased value from the beginning of the supply chain to the end through the use of technology like blockchain, robotics, automation, Bluetooth beacons and Radio Frequency Identification (RFID) devices.

As we progress through the spectrum of logistics models from 1PL to 5PL, it's clear that more and more of the logistics function is in the hands of the provider

rather than the enterprise itself. The most common models now are 3PL and 4PL and we'll look at how each one can help solve supply chain challenges.

Advantages of 3PL

A 3PL will offer innovative strategies to transform your supply chain into a cost-effective, responsive model. Consider what we're doing at Warehouse Anywhere as an example. In contrast to the traditional single distribution center (DC) model, we have pioneered and perfected forward-deployed inventory management. The common hub-and-spoke DC model is not able to keep up with the pace of business, with large inventories and infrequent truck service. We've developed the forward-deployed model for warehousing and distribution that uses a larger number of smaller locations to move products closer to the customer. This decentralized, hyper-connected model provides the responsiveness needed to meet customers' expectations for timely delivery.

No matter if you're direct-to-consumer or in a service-level agreement situation, customers expect overnight delivery, or as close to it as possible. The Warehouse Anywhere system can optimize your inventory per location to ensure stock is on hand in areas of highest demand. You will save on transportation and logistics expenses while improving customer service.

Disadvantages of 3PL

While the 3PL model has been successful for decades, there are some things to consider. Perhaps the most significant caveat is the lack of direct oversight and control. After all, a 3PL is an outsourced service provider. That means some activities will take place outside of your direct supervision. Ensuring quality control and customer service requires an extra level of diligence. If a 3PL fails to deliver on a customer's expectation, the customer will blame your company, not the 3PL.

Another issue is the degree of dependency a 3PL can create. When you outsource a significant segment of your business, it can be difficult to switch providers or take the operations in-house if pricing or service levels no longer meet expectations.

Material Handling:

Physical distribution of items entails a variety of tasks, including storage, transportation, and material handling. The majority of product damage occurs

during loading and unloading. These defects cause product damage, which causes the company to lose money and leads to consumer discontent.

Transportation:

Transportation is a significant part of the organization's overall logistical costs. The cost of transportation is determined by two factors: density and slowness. As a result, packaging materials should be low in weight to decrease shipping costs.

Warehousing:

Once a product is created, it must be kept in a warehouse before being distributed to users. The length of time spent in warehousing is variable and relies on the type of demand. As a result, packing should be designed to take up as little warehouse space as possible. This aids in expanding the warehouse's storage capacity.

Communication:

During its journey from point of origin to point of consumption, packaging serves as a vital communication tool. The instructions on how to transport, recycle, and dispose of the package or product are printed on the box or label. The government requires certain types of information with pharmaceutical, food, medical, and chemical items. Information on the contents, tracking, and handling instructions, among other things.

There are a large variety of material and containers that are used for packaging. Below is a list of the most common packaging materials used all over the world.

The physical distribution process involves storage, handling and transportation of the product during its journey from manufacturing plant to the end customer. For ease in distribution process, individual products are grouped together in quantities to form a package which can be conveniently moved in the distribution system. This process of grouping large number of products in convenient packs is called unitization.

For consumer goods, unitization commonly proceeds to quantities closely related to the need of the consumers and the channel members. They are put in a master carton, bin or box. However, for logistical packaging the individual products (depending on size) or master cartons are further grouped together and put into the wooden crate or container for ease in transportation, storage and handling. Processed food, automotive parts and consumer items are unitized in numbers, weights and volumes depending on the purchasing needs of the customers. The unitization of load plays an important role in enhancing the efficiency of the logistical system. The unit load may be stored, transported and handled with mechanical equipment during its journey from place of dispatch to the place of final delivery. The most common method of unitization is the use of containers.

1. Containers

The ultimate unitization upward is being developed under the concept of containerization. The containers are devices in which individual items or master cartons are placed during transportation activity. The purpose of providing the box container is to protect the products or the master cartons from damage during transportation, storage and multiple trans-shipment handling. This is the most common method of load unitization for long-distance shipments because of the following reasons:

Excellent protection from environmental effects

Space economies

Substantial reduction in transit damages

Reduction in pilferages

Facilitate inter-modal transportation

The box containers are cubical constructions and are fabricated out of steel or aluminium sheets. There are various standard sizes of containers used in sea, rail and road transportation. However, the most common sizes in use are 40 feet or 20 feet long containers. The freight containers' size and capacity details are discussed in Chapter 8.

2. Pallets

Another method of load unitization is stacking individual products or master cartons on the pallets and tightly securing them with metal straps or shrink films.

Handling of pallets is done with forklift truck. Pallets packaging does not give complete protection to the product from the environmental effects.

Palletization offers tremendous advantages in transportation and handling of the goods. The pallet gives better stability to goods during transportation in terms of damage protection as compared to individual handling of the master cartons. It enhances the productivity of the logistical system and reduces the cost of handling. Due to the standardization of pallet sizes conforming to the international standard, loading and unloading operations have become very easy. There are two-way or four-way entry pallets, the choice of which depends on method of storage, handling and transportation.

To boost the ease of doing business and enhance the liveability quotient, Prime Minister Narendra Modi launched the National Logistics Policy (NLP) on 17th September 2022 in Vigyan Bhawan, New Delhi. The policy aims to lower the cost of logistics from the existing 13-14% and lead it to par with other developed countries. This will increase the competitiveness of Indian products in both the Indian home market and the international market. Moreover, the reduced cost will also increase efficiency efforts cutting across all sectors of the economy, which encourages value addition and enterprise.

National Logistics Policy revitalises many fields. Today, India is preparing the ground before introducing any policy; only then can a policy be implemented successfully. NLP took eight years to develop. Policy shifts and major decisions are being made to quick last-mile delivery, ending transport-related issues, saving manufacturers time and money, and preventing wasting agricultural products. Coordination improvements will boost sector speed, value creation, and entrepreneurship.

The National Logistics policy is a comprehensive effort to address cost and inefficiency by issues lying down an overarching interdisciplinary, cross-sectoral, and multi-jurisdictional framework for the developing entire logistics ecosystem. The goal of this policy is to make the logistics industry more efficient and lower its costs. The strategy aims to boost economic growth, provide employment opportunities, and make Indian products more competitive in the global market.

The goal of the Prime Minister is to create a modern infrastructure of a world-class standard by including all relevant stakeholders in the process of holistic planning and implementation. This will allow for greater efficiency and synergy during the project's execution. In this regard, the Prime Minister's initiative, PM GatiShakti, also known as the National Master Plan for multi-modal connectivity, which was introduced in the previous year, was an essential first step. Establishing the

National Logistics Policy will support the PM GatiShakti initiative and complementarity.

The backbone of India's international trade is logistics, which aids in the diversification of not only the country's exports but also of products manufactured in the countries. The NLP thus aims to promote seamless movement of goods and enhances the competitiveness of Indian industries. Also, it seeks to reduce the logistics cost from 16 per cent of Gross Domestic Product (GDP) to a global average of 8 per cent by 2030. Further, as per the estimates, the worth of the Indian logistics market will be around \$ 215 Bn in the next two years compared to \$ 160 Bn. Investment Information and Credit Rating Agency of India Limited (ICRA) estimates that the sector will develop at a Compound Annual Growth Rate (CAGR) of 10.5 per cent through 2025 after growing at a CAGR of 7.8 per cent over the past five years. This sector employs more than 22 million people in India, which through skill development is expected to grow at the rate of 5 per cent in 5 years. The four significant steps to be undertaken for NLP include:

Integration of Digital System (IDS): There will be digital integration of different systems of seven various departments (like road transport, railways, aviation, commerce ministries and foreign trade)

Unified Logistics Interface Platform (ULIP): This ensures shorter and smoother cargo movement and enables the exchange of information confidentially on a real-time basis. This National Industrial Corridor Development Corporation (NICDC) Logistics Data Bank Project has been leveraged.

Ease of Logistics (ELOG): will enable and ensure the ease of logistics business through transparency and accessibility

System Improvement Group: will monitor all logistics-related projects regularly

The programme aims to ensure that logistical problems are minimized, exports increase significantly, and small businesses and the people who work in them gain profit. All this will augment the economy in various ways like employment generation, inter-state, and international exchange of goods. This policy move will bring India closer to becoming a global manufacturing powerhouse and pave its way to becoming a logistics hub.

The NLP's transformational capacities further increase when combined with previous connectivity and infrastructure improvement programs like:

The Gati Shakti Programme's goal is to implement infrastructure connectivity, including roadways and railways projects across the nation, in a coordinated manner.

The Sagarmala - envisions using the potential of the coastline and waterways to reduce the amount of infrastructure needed to reach their targets.

The Bharatmala - focuses on reducing critical infrastructure gaps to increase the effectiveness of road traffic circulation across the nation.

The above core initiatives will help create a single window e-marketplace as a one-stop shop for relevant knowledge and information exchange that can ease logistics facilitation matters in the country.

There have been some noteworthy changes in the Indian ports already, as the capacity of Indian ports has increased significantly, and the average turnaround time for cargo ships has decreased by 18 hours. Forty air cargo ports have been built to increase exports, and thirty airports have been equipped with cold storage facilities. There will soon be 35 multi-modal hubs nationwide, enabling seamless freight movement. The development of waterways is a direct response to the pressing need for environmentally friendly and cost-effective transportation alternatives.

India's latest policy of Comprehensive Logistics Action Plan (CLAP), provides details and a push to the NLP's specific targets. It focuses on reducing India's logistics cost to a level comparable to global benchmarks by 2030. It thus aims to be among the top 25 countries by 2030 in the Logistics Performance Index (LPI) (according to the World Bank Logistics Index of 2018, India is ranked 44th in logistics cost).

Further, better technology has been adopted to strengthen the logistics sector. For example, paperless export-import trade operations have been made possible by the e-sanchit portal, and faceless evaluation in customs has been implemented. E-way bills and FASTag are also frequently used on roads to boost the effectiveness of the logistics industry. Also, a unified tax system like Goods and Services Tax (GST) enables ease in issues related to the logistics sector.

The industry observers' are further sure that NLP will bring a brand-new transformative approach to the country's logistics ecosystem, increasing the efficiency across supply chains. Arindam Guha, Partner, Government and Public Services Leader, Deloitte India, anticipates that the new programme will enable a modal shift in logistics away from the current over-reliance on roads (over 60 per

cent share currently versus 25 per cent globally) and toward railways (30 per cent currently versus around 60 per cent globally) and waterways, which presently have a 5 per cent share in the modal mix.

India aims to become \$ 5 Tn economy by 2024-25. For this, connectivity and robust infrastructure will become crucial points, and the NLP provides the required boost for the sector to this effect. This policy will augment warehousing capacity and enable faster communication to take products closer to their consumption points. NLP will also bring new energy to all other sectors. As logistics develop, manufacturing, production, automobile, and other industries like warehousing and infrastructure development will also develop. This will spur the growth of commercial real estate and industrial parks.

NLP will thus promote the facilitation of a unified regulatory environment and institutional framework governing the sector that will set up multi-modal logistics parks (MMLPs) as key markets. This will ensure faster first and last-mile connectivity, and as logistics improve, the export-import, manufacturing, cold storage, and industries will also grow.

The Process of National Logistics Policy Implications

The National Logistics Policy (NLP) unfolds through a meticulously orchestrated process, aiming to overhaul India's logistics and supply chain infrastructure radically. This involves a multi-tiered strategy designed to tackle various systemic inefficiencies and promote a more cohesive, cost-effective, and sustainable logistics ecosystem.

1. Stakeholder Engagement

The first step involves comprehensive consultations with stakeholders across the logistics spectrum, including government bodies, private sector participants, and academia. This collaborative approach ensures that the policy addresses the real-world challenges and opportunities within the logistics sector.

2. Infrastructure Development

A core focus of the NLP is enhancing physical infrastructure. This includes developing dedicated freight corridors, logistics parks, and port modernisation projects. Such infrastructure improvements are crucial for reducing transportation times and costs, thereby increasing the overall efficiency of logistics operations.

3. Digitization and Technology Adoption

Implementing advanced technology solutions and digitizing key logistics processes form another essential aspect of the NLP. Initiatives like the Unified Logistics Interface Platform (ULIP) aim to integrate various digital systems across the logistics value chain, facilitating seamless data exchange and improving tracking and transparency of goods movement.

4. Policy Reforms and Simplification

The NLP also proposes significant policy reforms aimed at simplifying and streamlining regulatory procedures related to trade, customs clearances, and goods movement. Reducing bureaucratic hurdles and simplifying documentation processes are targeted to make it easier for businesses to engage in import-export activities.

5. Skill Development and Capacity Building

Recognising the need for a skilled workforce to support a modernised logistics sector, the NLP includes initiatives for skill development and capacity building. Training programs and partnerships with educational institutions are envisaged to

create a pool of trained professionals adept at handling the demands of a technologically advanced logistics infrastructure.

6. Sustainability Initiatives

The policy underscores the importance of environmentally sustainable logistics practices. It encourages the adoption of green logistics, including the use of renewable energy sources in warehousing and transportation and the promotion of electric vehicles for last-mile connectivity.

What Are the Implications for Businesses and Industries for NLP?

The National Logistics Policy (NLP) holds transformative implications for businesses and industries across India, heralding a new era of efficiency, cost-effectiveness, and global competitiveness. Here's an overview of the critical impacts:

1. Reduced Logistics Costs

One of the primary goals of the NLP is to reduce logistics costs as a percentage of GDP, which is significantly higher in India than in global standards. For businesses, this means potential savings in logistics expenses, translating to lower overall operational costs and more competitive pricing for their products and services.

2. Enhanced Efficiency

By streamlining processes, enhancing infrastructure, and embracing digitisation, the NLP aims to cut down transit times and improve the reliability of supply chains. Businesses can expect more predictable and efficient logistics operations, enabling them to meet customer demands better and manage inventory.

3. Improved Global Trade Competitiveness

With the reduction in logistics costs and increased efficiency, Indian businesses and industries are poised to become more competitive on the global stage. This could lead to expanded market access, increased exports, and a more substantial presence in international markets.

4. Fostering Innovation and Technology Adoption

The emphasis on digitisation and technology within the NLP encourages businesses to adopt modern logistics solutions, such as IoT, AI, and blockchain, for tracking and managing shipments. This drive towards technology adoption can spur innovation, leading to more advanced logistics and supply chain practices.

5. Sustainability and Green Logistics

The NLP's focus on sustainability and the promotion of green logistics practices aligns with the global shift towards environmental responsibility. Businesses will be encouraged to adopt eco-friendly practices, which can not only reduce their carbon footprint but also appeal to environmentally conscious consumers.

6. Skill Development and Employment Opportunities

The policy's initiatives aimed at skill development and capacity building in the logistics sector are expected to create a more skilled workforce, benefiting industries reliant on logistics for their operations. This can also lead to job creation, contributing to economic growth.

For businesses and industries, the National Logistics Policy is not just about enhancing logistics operations; it's about catalysing comprehensive growth, fostering innovation, and building a sustainable and competitive future. The policy's successful implementation could mark a significant leap forward for India's economy, offering ample opportunities for businesses to thrive in an increasingly interconnected world.

Why Is National Logistics Policy Important?

The National Logistics Policy (NLP) is not merely an initiative; it's a critical step towards redefining the landscape of logistics and supply chain management in India. Its importance stems from several foundational needs and aspirations of the nation's economy and its position in the global market. Here are some reasons why the NLP holds paramount importance:

1. Global Competitiveness

In an era where speed, efficiency, and cost determine market leadership, the NLP aims to equip India's logistics sector with the necessary tools and infrastructure to

compete globally. Reducing logistics costs to a competitive level is essential for enhancing the export potential of Indian goods and services.

2. Economic Growth

By addressing the inefficiencies within the logistics and supply chain sector, the NLP paves the way for smoother internal and external trade flows. This efficiency is crucial for economic growth, as it directly impacts the ease of doing business, attracts foreign investment, and boosts GDP.

3. Inclusivity and Access

The policy emphasizes the integration of various modes of transport and the development of infrastructure across regions. This inclusivity ensures that businesses, regardless of their size or geographic location, have access to efficient logistics services, democratising opportunities for growth and expansion.

4. Sustainability

With a clear focus on adopting green logistics practices, the NLP aligns India's logistics sector with global environmental goals. This commitment to sustainability is vital for ensuring long-term ecological balance and fulfilling the nation's obligations to future generations.

5. Employment Generation

The logistics sector is labour-intensive, and the NLP is expected to create substantial employment opportunities by streamlining operations and expanding infrastructure. This job creation is crucial for absorbing the nation's burgeoning workforce and contributing to societal well-being.

6. Technological Advancement

Encouraging the adoption of digital technologies and innovative logistics solutions, the NLP positions India at the forefront of the logistics tech revolution. This advancement is vital for keeping pace with changing global standards and consumer expectations.

The National Logistics Policy is a cornerstone for India's aspiration to become a logistics and supply chain hub. Its importance transcends logistics, touching upon economic, social, and environmental facets, making it a key driver for comprehensive national development.

UNIT V ROLE OF IT AND CURRENT TRENDS

Supply Chain Integration - Building partnership and trust in SC Value of Information, Logistics information system - Role of IT – Framework for IT adoption. - Business Process Reengineering-ERP and EDI, Supply Chain and CRM, Agile supply chain, Reverse logistics, Green logistics and supply chain.

Supply chain integration is a business strategy that connects the various participants in a supply chain to work together towards a common goal. The goal is to optimize performance by making sure everyone is working towards the same goal, while also improving efficiency and reducing costs.

Supply chain integration can involve:

Increased communication and coordination: Connecting more entities in the supply chain, and increasing the level of communication and coordination between them

A shared management information system: Coordinating supply chain activities through a shared system

Transparency: Ensuring complete system transparency from the supplier to the customer

Benefits of supply chain integration include:

Improved relationships: Better relationships between all stakeholders in the supply chain

Better decision making: Businesses can make data-driven decisions that positively impact the bottom line

Reduced costs: Reduced costs, especially transactional costs between subsidiaries, partners, and vendors

There are different levels of supply chain integration, ranging from lower level integration with informal interactions to higher levels where the supply chain is synchronized in real time.

the 4 C's of supply chain management—collaboration, communication, coordination, and competence—are essential for building a robust and efficient supply chain. Each of these elements plays a crucial role in ensuring that the supply chain operates smoothly and meets customer expectations.

Understanding the Three Levels of Supply Chain Management

Strategic Level. The top-level of supply chain management is responsible for the long-term decisions of the company.

Tactical Level

Operational Level

What is Supply Chain Integration?

Supply chain integration is a strategy that establishes a single system that can bring together multiple stakeholders involved in the process for greater efficiency, both in terms of productivity and cost savings.

Supply chain integration is done to create an efficient system that starts from raw materials from the supplier to the end product going to the consumer without delays, increases in cost, or poor customer experience.

An organization strives to build a superior supply chain with the help of integration. It involves complete system transparency, from the supplier to the customer.

Also read: [Supply Chain Convergence in a Disruptive Environment](#)

Critical Elements of Supply Chain Integration

Multiple elements at multiple levels in an enterprise must work together to achieve integration in the supply chain. As the supply chain integration benefits far outweigh the efforts in establishing the processes, it is essential to understand the key elements to achieve supply chain integration.

Choosing the right vendors

A business needs to choose the right vendors who are willing to meet the standard requirements at the right price and at the right time.

Working with internal teams

A business needs to work closely with internal teams in the supply chain and across the organization. Therefore, you can expect efficient supply chain processes with the internal team onboard for supply chain integration.

Waste elimination

A business needs to focus on eliminating wastage from supply chain processes. It can be done via manual changes or with gaps identified with the procurement software.

Barriers to Supply Chain Integration

There are several barriers to the supply chain integration process. Some of the critical barriers to supply chain integration are:

Lack of IT solutions

Lack of knowledge

Poor working relationship

Lack of communication

Cost of integration

Conflicting goals

Information Sharing in Supply Chain Integration Process

Information sharing is an integral component in building the process. Organizations must make a single platform to enable transparent communication because it supports long-term cooperation and coordination, which is essential for achieving efficiency. However, the lack of information sharing among stakeholders can lead to inefficiency in coordinating actions within the organization.

The rise of technology in the supply chain process has made it easier to achieve seamless communication among all stakeholders. As a result, a business can

communicate past, present, and future challenges and opportunities with various stakeholders. Therefore, setting the proper foundation for the organization's integrated supply chain process is vital.

Most companies go through the following stages of information sharing in the supply chain integration process:

Baseline

The baseline is the first stage where each department within an enterprise manages its supply chain. This is, however, a siloed approach. It might have some benefits depending on the overall structure of an enterprise, but it is nonetheless an inefficient system for any business.

Functional Integration

In this stage, the various departments within an enterprise are expected to work together to achieve better efficiency in the supply chain. In this stage, there is

greater information sharing than in the baseline stage. For instance, a business can do this by combining orders, scheduling tasks and other initiatives.

Internal Integration

The various departments in the enterprise are connected to the same system during this stage. This stage increases information sharing as compared to the previous step. It typically involves using supply chain software for seamless communication.

Course Code:	20MBO301
Course Name:	SUPPLY CHAIN AND LOGISTICS MANAGEMENT

Year / Sem:	II/III
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Specify any Databook / Sheet / Graph / Plots / has to be provided

UNIT - I

Unit - I / Part - A / 2 Marks				
S.No	Questions	Mark Splitup	K – Level	CO
1.	Define SCM.	2	K1	CO 1
2.	Recall the objectives of SCM	2	K1	CO 1
3.	Describe the scope of the supply chain.	2	K1	CO 1
4.	Describe the supply chain network of any FMCG Company of your choice.	2	K1	CO 1
5.	Appraise the terms inbound and outbound logistics.	2	K5	CO 1
6.	Evaluate any three best practices of SCM.	2	K5	CO 1
7.	List out the characteristics of good measure.	2	K1	CO 1
8.	Critically examine the drivers of supply chain performance.	2	K4	CO 1
9.	Demonstrate an auto components manufacturing company's outsourcing decision.	2	K3	CO 1
10.	What are the functions of logistics management?	2	K1	CO 1
11.	List out the best practices in Logistics.	2	K1	CO 1
12.	Recall the best practices in SCM.	2	K1	CO 1
13.	State the primary motivators for Make or Buy Decision.	2	K1	CO 1

14.	List out the current supply chain Strategies.	2	K1	CO 1
15.	Give a few examples of outsourcing in the Manufacturing sector.	2	K1	CO1

Unit - I / Part - B / 13 Marks				
S.No	Questions	Marks	K – Level	CO
1.	Explain the Supply Chain Management Perspectives in managerial decisions with examples	13	K3	CO1
2.	Explain the evolution of supply chain management.	13	K2	CO1
3.	Evaluate the importance of Logistics in the supply chain.	13	K5	CO1
4.	“Supply chain Network Design can be explained as the strategic planning of the supply chain in order to measure the cost and the time required to bring the goods and services from manufacturers and suppliers to the market.” Discuss	13	K2	CO1
5.	Explain the components of Logistics management.	13	K2	CO1

Unit - I / Part - C / 15 Marks

S.No	Questions	Marks Split up	K – Level	CO
1.	<p>Case Study</p> <p>L’Oréal is the world’s leading cosmetics company, with consolidated sales of Rs. 14 billion euros, with 300 subsidiaries across the globe and having presence in over 150 countries. They develop more than 3000 formulas each year, and have a worldwide team of 50,500 employees, including 3000 employees in research spread over 42 factories across the globe. L’Oréal India, spread across 300 major towns and cities, has three mother brands—L’Oréal, Garnier, and Maybelline— and achieved a growth of 70 percent over the last two years. The company manufactures products in various categories for both the mass as well as the premium segment—hair colour and care, skin cleansing and care, and make-up. L’Oréal India recorded a turnover of INR 6 billion and a growth of nearly 40 percent in 2007.</p> <p>Regulations in India in 1990 prevented L’Oréal from entering solo, and the company formed a joint venture with the MJ Group to launch the Ultra Doux range of hair care products. Encouraged by the acceptance of its</p>	15	K5	CO 1

	<p>brand in India, L'Oréal seized the opportunity to break the JV and formed its own subsidiary in 1994.</p> <p>The company has commissioned a plant near Pune, providing proximity to the company's head office in Mumbai. This plant manufactures hair care, hair colour, and skincare products for the Indian market, besides exporting to neighbouring countries. Consumers are likely to get benefitted from the most advanced production quality standards, with manufacturing processes in the plant taking place in well-defined, isolated zones to minimize contamination.</p> <p>The new facility is equipped with the most modern effluent treatment plants. L'Oréal has an ever-expanding SKU range of over 700 in number. Eighty percent of its SKUs (finished goods) and 76 percent of the raw materials are imported, even for the locally manufactured products. These imports contribute to a longer lead time. The company's logistics network consists of 23 warehouses, 637 distributors, and 59,500 retailers.</p> <p>The company distributes the material through 23 clearing and forwarding agents (C&FA)—one in each state—who provide warehousing, invoicing, and delivery facilities. Consignment sales through C&FA are helping L'Oréal India to avoid double taxation of 4</p>			
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<p>percent for inter-state sales, bring in the flexibility of order sizes and enhance the efficiency of transportation. Currently, the cost of transportation is less than 2 percent of net sales. The stocks at C&FAs, dealers and retailers are for 60 days, 30 days, and 30–90 days, respectively. The break-up of logistics costs at L’Oréal India is 1.5 percent freight, 0.7 percent warehousing, and 0.3 percent overheads totalling 2.5 percent, which is within the FMCG industry standards. On average, the payment receivable stands at 10 days. The SKU level is 725, consisting of 455 for consumer products, 239 for professional products and 31 for active cosmetics. At any point of time, fast-moving SKUs are 200. The company has a flexible ordering system by distribution through CFA with a frequency of twice a week to once a month.</p> <p>Procurement planning and scheduling for imported SKUs is based on the sales forecast (both for domestic and export markets). Order quantity is worked out by considering 75 days lead time for “A” class items and 60 days for the rest of the items and deducting the stocks in transit to 23 warehouses. For individual regional requirements, the same process holds good.</p> <p>The company had changed its policy of holding two months’ stock (one month at the national warehouse and another at the CFAs) because of some supply</p>			
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	<p>chain optimization initiatives, which resulted in the stock cover falling to just about 40 days. This was because of adopting efficient distribution practices (such as managing to distribute the right stocks at the right place and at the right time) that resulted in avoiding heavy shortages. A large increase in volumes enabled the company to renegotiate freight rates with transporters and a reduction of 11.5 percent was achieved by the department. Another reason contributing to the overall reduction in operations cost was the increase in sales volume, which led to the increase in manufacturing batch sizes resulting in lesser production costs and better margins for 2007.</p> <p>Unlike its competitors, L'Oréal India is not into the JIT (just-in-time) stock management system. It follows the practice of keeping one month's inventory at the CFA level at the beginning of the month and another one month's stock at the warehouse plus in-transit inventory resulting in increased inventory-holding costs for the company. Improper forecasting (68 percent accuracy) is what is responsible for this lower performance compared to the competitors. Further steps towards improvising forecasts will help the company to reduce the inventory-holding costs, thereby enhancing the profit margins.</p>			
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	<p>Questions</p> <p>I. Discuss the methods by which L’Oréal can enhance the level of its forecast accuracy to improve the supply chain performance.</p> <p>II. Critically evaluate L’Oréal’s logistics process and distribution flow and find out if there is scope for system performance improvements.</p>			
2.	<p>Case Study</p> <p>Gati Ltd started in 1989 as a cargo management company and has emerged as a leading express cargo company and a pioneer in distribution and supply chain management solutions in India and Asia Pacific regions. Gati had a professional strength of 6400 dedicated employees and a turnover of INR 751 crores in the year 2009–10. It is well ahead in identifying the segmental logistics needs of the Indian markets and providing value-added services to its demanding customers in retail and other sectors. Integration of the latest and best technological innovations in the service and support network comprises the business philosophy of Gati. It has headquarters in Secunderabad, Andhra Pradesh, and an office in Singapore. Recently, Gati has also ventured into the cold-chain network. In a span of 18 years, Gati has</p>	15	K6	CO 6

	<p>explored various ways of providing premium value to customers, thereby setting benchmarks in service quality and customer satisfaction with the help of value-added logistics solutions.</p> <p>Gati Air Express specializes in delivering shipments across major locations on the very next day of the order, even during business hours. Some of the prime locations get delivery of the order even before noon sets in. A fleet of dedicated freighters (cargo planes) that fly during the night and a seamless multimodal network that goes down to the last mile to ensure that shipments arrive on time make this task possible. Gati has promised its customers that freight would be refunded if the assured timelines are not met by the company.</p> <p>Gati is equipped with over 4000 vehicles on road covering 594 out of 608 districts in India. It also has mechatronic as well as warehousing facilities of 1.5 million sq. ft. across all major cities. This helps them in offering world-class single-window solutions to customers. In 1996, Gati tied up with Indian Airlines to facilitate speedier delivery of shipments. This 12-year-old relationship has now been further strengthened with the launch of the co-branded (Air India Gati) air cargo and courier service leading to delivering valuable services to the customers from the</p>			
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	<p>synergies of the two majors in air and surface networks.</p> <p>Gati's advantage of seamless connectivity across air, road, ocean, and rail has resulted in a plethora of offerings to the customers, which are unmatched in the industry. Besides having a strong network in India, Gati also has a strong market presence in the Asia Pacific region and SAARC countries. Today, Gati has offices in China, Singapore, Japan, Dubai, Hong Kong, Thailand, Nepal, and Sri Lanka and has plans to foray into other markets. Through its nationwide logistics network, GATI AIR EXPRESS promises next-day before noon delivery to certain locations, particularly the metro cities and national business centers. However, in other locations (B-grade cities) the services are for next-day delivery.</p> <p>Questions</p> <ol style="list-style-type: none"> a) What are the value additions that Gati offered in its logistics services to customers? b) How could Gati get seamless connectivity in its logistics activities? c) Discuss the role of partnership in enhancing the effectiveness of the logistics system? 			
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UNIT - II

Unit - II / Part - A / 2 Marks				
S.No	Questions	Mark Split up	K – Level	CO
1.	State the factors that influence global supply chain decisions	2	K1	CO 2
2.	List out the phases in network design.	2	K1	CO 2
3.	Discuss decision tree analysis.	2	K2	CO 2
4.	Identify the various issues in network optimization- Discuss	2	K2	CO 2
5.	Describe value addition and differentiation of the supply chain.	2	K2	CO 2
6.	Describe the Hub and Spoke Model in Supply Chain.	2	K2	CO 2
7.	State the importance of the decision tree in the supply chain decisions.	2	K1	CO 2
8.	list out the advantages of the Hub and Spoke model in the Supply Chain.	2	K1	CO 2
9.	Describe the motive behind supply chain optimization models.	2	K2	CO 2
10.	State the role of distribution network design.	2	K1	CO 2

Unit - II / Part - B/ 13 Marks				
S. No	Questions	Marks Split up	K – Level	CO
1.	<p>Explain the impact of the following online sales with respect to the Cost and service Factors of the Distribution network.</p> <p>(i) Amazon Online sales of books compared to the traditional method of sales</p> <p>(ii) Netflix Online sales compared with the traditional method of DVD sale.</p>	13 7 6	K3 K3	CO 2
2.	Discuss the challenges in designing a global supply chain network design.	13	K3	CO 2
3.	Explain the decision-making environments for supply chain networks under uncertainty	13	K3	CO 2
4.	“Many companies find that value-added logistics services help give their supply chain a competitive edge” Elucidate	13	K4	CO 2
5.	Explain the various distribution network design with examples.	13	K3	CO 2

Unit - II / Part - C / 15 Marks
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S. No	Questions	Marks Split up	K – Level	CO
1.	<p>Case Study:</p> <p>Shoppers’ Paradise has a swanky mall at Andheri, Mumbai. They have a complete range of who’s who of shopping items. It was a shop-in-shop based on international standards. The shop area is nearly 3, 50,000 square feet and about 25,000 customers visit the mall daily.</p> <p>Fierce competition has driven Shoppers’ Paradise to tie up with music companies, popular food outlets, etc. This ensures at least a certain percentage of sales. Again, to ensure that no stock-outs take place, Shoppers’ Paradise has built a warehouse close to its mall. The warehouse has sufficient storage capacity. Based on consumption patterns, the warehouse is stocked with the required inventory.</p> <p>Shoppers Paradise basically targets higher-income groups. Therefore, it prefers to use roadways for the transport of goods from the vendors. Though expensive as compared to railways, roadways have advantages in terms of door-to-door delivery, quicker</p>	15	K6	CO 2

	<p>decisions regarding changes in routes or change in delivery schedules, etc.</p> <p>Shoppers Paradise physically opens the packs received from the vendors. It sorts out the goods and puts the necessary price tags on them. The goods are then repacked to be appropriately stacked for final delivery, as and when required.</p> <p>Since no heavy inventory has to be transported, mechanized material handling is not used since it would involve heavy capital investment. Pallets and crates are used extensively. Again, when goods are returned by the customers due to defects, Shoppers Paradise sends the goods to the warehouse from where the goods are sent back to the concerned vendor. The cost of the return is borne by the vendors.</p> <p>In case of new arrivals of stock, the sales department of Shoppers Paradise puts up billboards about the new stock early in the morning, before the customers rise. This makes it convenient for the customers to know about new arrivals.</p> <p>Shoppers Paradise is very keen to ensure that the customers get the right product at the right time. At the same time, the management of Shoppers Paradise desires to reduce the overall cost. You are appointed</p>			
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	<p>as a Logistics Consultant. Suggest ways to improve the performance of Shoppers Paradise.</p> <p>Questions:</p> <ul style="list-style-type: none"> a) Study and discuss the implications of logistics network design b) Discuss the modes of inventory sourcing c) Analyze the alternative modes of communication d) Study various in which Shoppers Paradise can increase productivity 			
2.	<p>Case Study</p> <p>Global Engineers is a decade-old engineering organization engaged primarily in the manufacturing of switchgear of various ranges. Its manufacturing unit is situated in Delhi but its sales are spread all over the country. Apart from Global Engineers, there are two other fierce competitors in the switchgear market who, between them, have captured 75% of the market share.</p> <p>During the initial years of manufacturing, Global Engineers concentrated in the northern region. After that, it moved towards selling its products across the entire country. For this, Global Engineers required an efficient logistical distribution system. It has established hub warehouses at strategic of geographical locations, but the problem of inadequate</p>	15	K6	CO 6

	<p>space and/or stock outs continues to pose a serious problem. The company is contemplating outsourcing its distribution.</p> <p>As regards transport, at present the company has its own fleet of transport. But delivery schedules get affected due to various reasons. One of them is absenteeism among the staff. The second is that many times trucks have to leave without adequate stocks due to various problems in production schedules. On the return journey, the trucks are empty. The drivers delay in returning giving various excuses for the same.</p> <p>Because of its low share in the market, the pricing policy of the company has always been to charge lower than its competitors. Discounts offered are flexible. Many times the company deals directly with the customers because they can offer better pricing terms and know the customers' requirements first-hand. On the other hand, competitors' strategy has been to maintain high quality because they feel that the customers will not hesitate to pay a little more if they are assured of a product have better performance and efficiency.</p> <p>For better sales and service, the company has appointed dealers in various regions of the country.</p>			
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	<p>The dealers not only sell the goods manufactured by the company, but also those manufactured by the competitors. The dealers sell various other engineering products as well. There has been a general complaint among the customers of Global Engineers that the after-sales service provided by the dealers is not satisfactory. The company, on receiving such complaints, sends letters to the dealers to improve their services. Beyond that, nothing is done.</p> <p>The dealers of the company have got together to list their problems. They have stated that they want a higher rate of commission in comparison with that offered by the competitors. Secondly, they want the company to improve upon the quality of the product which will reduce the complaints by the customers. Thirdly, they want engineers from the company to visit them at regular intervals so that the dealers can apprise them directly about the requirements of the customers. Fourthly, the dealers want an efficient transport system to ensure timely delivery of the products and spares.</p> <p>Questions</p> <p>a) Explain your views regarding the establishment of an efficient distribution network for the company. You have to envisage all possible alternatives</p>			
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	<p>b) What improvements do you suggest for improving the performance on the inbound and manufacturing cycles?</p> <p>c) Discuss the various steps the company should take to win back the confidence of its customers.</p> <p>d) Critically examine the dealers' suggestion that the company must send its engineers to their service centers at regular intervals</p>			
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UNIT - III

Unit - III / Part - A / 2 Marks				
S.No	Questions	M ar k S pl it u p	K - L e v el	CO
1.	Describe the bullwhip effect with suitable examples.	2	K2	CO3
2.	Identify a suitable warehouse layout for bulk storage.	2	K2	CO3
3.	List out the various components of a warehouse.	2	K1	CO3
4.	What are the key decisions used for designing a distribution network?	2	K1	CO3
5.	Explain the importance of value addition in the supply chain.	2	K3	CO3

6.	Illustrate the distribution network for Manufacturer storage with direct shipping.	2	K3	CO3
7.	Recall the different types of warehouse layouts.	2	K1	CO3
8.	Critically examine the role of network design in a supply chain	2	K3	CO3
9.	Describe an Automobile company's warehouse decision.	2	K2	CO3
10.	Explain the impact of big basket sales of groceries compared to traditional methods of sales with respect to the Cost and service Factors of the Distribution network.	2	K3	CO3
11	Recall the functions of warehousing.	2	K1	CO3
12	Appraise the term Virtual warehouse	2	K5	CO3

Unit - III / Part - B / 13 Marks

S. No	Questions	Marks Split Up	K – Level	CO
1.	Evaluate the various factors that affect the size of a warehouse. How can layout and design affect warehouse efficiency and productivity?	13	K5	CO3
2.	Discuss the various functions of a warehouse from logistics and supply chain perspectives.	13	K2	CO3
3.	Considering yourself as a Cold Chain Manager, analyze and prepare a list of Cold Chain Issues that	13	K4	CO3

	you may have to address for properly managing the Cold Chain System.			
4.	The effectiveness of marketing in the organization can be considerably enhanced by proper a decision on warehousing. Explain.	13	K3	CO3
5.	Discuss the site selection criteria for the warehouse location.	13	K2	CO3
6.	As the CEO of the logistics firm, how would you go about creating a warehousing chain across the country? Discuss the scope, challenges, and barriers in building the service chain.	13	K2	CO3

Unit - III / Part - C / 15 Marks				
S.No	Questions	Marks Split up	K – Level	CO
1.	Case Study Ace Dairies gives a home delivery service for milk, dairy products and a range of related goods. Roger Smitheram has run the dairy for the past twelve	15	K6	CO3

<p>years. His product is a combination of goods (the items he delivers) and services (the delivery and associated jobs he does for customers). At the heart of operations is an information system that contains full details of all of Roger's 500 customers, including their regular orders, special orders, where to deliver, how they pay, and so on. Every day the system calculates the likely sales of all products in two days' time. Roger adds some margin of safety, allows for likely variations, and passes his order to Unigate Dairy in Totnes in Devon (about 150 km away). This Unigate depot acts as a wholesaler for milkmen in Wales and the southwest of England. The following evening it delivers to a holding depot in Camborne, and then takes Roger's goods 10 km to a cold store in Hayle. At 5.30 the following morning Roger collects the order from his cold store and starts delivering to customers. This normally takes until 1.30 in the afternoon, but on Fridays, he spends more time collecting money and often finishes after 5.00 pm.</p> <p>There are several specific problems facing Ace Dairies. There is, for example, some variation in daily demand, so Roger has to carry spare stock. He cannot carry too much, as dairy products have a short life and anything not delivered quickly is thrown</p>			
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	<p>away. Roger aims at keeping this waste down to 2 percent of sales. There are also problems maintaining a service during holidays, or when Unigate has difficulties with their deliveries. Perhaps Roger's main concern is maintaining his sales over the long term. Demand for doorstep deliveries is declining, as people buy more milk at supermarkets. The number of milkmen in Hayle has declined from ten in 1987 to three in 2002. Most of Roger's customers have been with him for many years, but he generates new custom by canvassing, delivering leaflets, special offers, carrying a range of other products, and so on.</p> <p>Questions</p> <ol style="list-style-type: none"> 1. Describe the supply chain for milk. 2. Where does Ace Dairies fit into this? What specific activities form the logistics in Ace Dairies? 3. What are the main problems that Ace Dairies has with logistics? 			
2.	(i) As a consultant, which technologies will you recommend for a retail chain having a network of 100 stores with four warehouse hubs and 10 satellite distribution centers across the country	8	K3	CO 3

	(ii) Review the various technologies used in logistics in general for an efficient and effective supply chain operation.	7	K2	
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UNIT - IV

Unit - IV / Part - A / 2 Marks				
S. No	Questions	Mark Split up	K – Level	CO
1.	Describe the operating characteristics of different transportation modes.	2	K2	CO 4
2.	List the factors that influence freight cost.	2	K1	CO 4
3.	Distinguish 3PL and 4PL	2	K4	CO 4
4.	List out the issues in Multimodal Transportation.	2	K1	CO 4
5.	Describe the Scope of Containerization in India.	2	K2	CO 4

6.	Describe the probable bottlenecks in returnable packaging systems.	2	K2	CO 4
7.	Suggest a suitable packaging material for electronic gadgets.	2	K2	CO 4
8.	Identify the critical reasons for outsourcing.	2	K1	CO 4
9.	State the importance of unitization.	2	K1	CO 4
10.	Distinguish consumer and Industrial packaging	2	K4	CO 4

Unit - IV / Part - B / 13 Marks

S. No	Questions	Marks Split up	K – Level	CO
1.	Discuss the various factors affecting the transportation cost and also select the product to highlight the importance of each factor.	13	K2	CO 4
2.	Discuss the various objectives of logistical packaging.	13	K2	CO 4
3.	“Packaging is usually a prerequisite for every product but also an important logistics activity because it is the packaged product that is transported, stored,	13	K5	CO 4

	carried, etc in the supply chain” Justify this statement in context with Industrial packaging.			
4.	Discuss the various critical issues which are to be addressed before the business process is outsourced	13	K2	CO 4
5.	“Logistics outsourcing will considerably enhance the competitiveness of the organization.” Discuss.	13	K2	CO 4

Unit - IV / Part - C / 15 Marks

S. No	Questions	Marks Split up	K – Level	CO
1.	<p>Case Study</p> <p>Food Savories Limited is engaged in the manufacturing of various types of fast food items that are ready-to-eat. It has been in the business for the past 12 years. It has its factory as well as a processing unit in Navi Mumbai. The raw materials required are mainly vegetables, and chicken which the company procures from either the local vendors or from various suppliers situated at Nasik, Pune, and other districts. The required materials are procured with the help of hired transporters. However, the hired transporters do</p>	15	K6	CO 4

not care much about the preservation of the goods. Hence, about 20% of the goods are lost due to damage, deterioration, pilferage, etc. Again, the hired transporters are unreliable with regard to their availability as well as prompt delivery schedules.

The company's products are quite popular with the customers who are situated in Mumbai, Navi Mumbai, Pune, etc. However, the company stands to lose the market due to erratic supply schedules which do not cater promptly to the customers. The packaging of the products is attractive, but it does not preserve the product for a long time. The shelf-life is only about 5 hours if the goods are not properly refrigerated. Loss on this account is about 10%.

The company has about 10 distribution centres. But there does not seem to be much coordination between these centres. A logistical information system is not adequate. Due to this, the company is unable to expand its business. In fact, due to competition, there is fear that the company may stand to lose its existing clientele. Due to mismanagement, the company is unable to meet an increase in the demands during festival seasons and holidays.

	<p>You are appointed as a logistics consultant. You are required to put forward your suggestions with regard to</p> <ul style="list-style-type: none"> a) Setting-up of proper, effective logistical information system to improve coordination [Note: Discuss about Logistics as an integrated process, ensuring proper planning] b) An Effective forecasting system to reduce inventory carrying cost, wastages, damages, pilferages [Note: Forecasting can be in terms of door-to-door surveys, questionnaires, telephonic interviews. For markets/stores that are close by, think of JIT strategies] c) Setting up of effective purchasing and distribution system [Note: Quality control with regard to purchases is required. Prefer those suppliers who can supply goods in their own transport] d) Improved system of storage, handling, and packaging [Note: Study warehousing, material handling system, and packaging. Write/discuss relevant points relating to the question.] e) Alternative modes of transport to reduce/eliminate wastages [Note: Study has to be made regarding capital investment in having own fleet of specialized trucks and related 			
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	variable costs versus hiring a specialized fleet of trucks. In the case of hired trucks, the agreement should be made with regard to compensation to be paid by the transport company in case goods are damaged/pilfered by them]			
2.	<p>Case Study:</p> <p>ABCL Ltd is a leading Fast Food Processing Company operating from Thane. It is involved in the fast food business for the last 10 years and has a tie-up with a foreign firm operating in the same field. It handles both vegetables as well as non-vegetable products for which it arranges the required vegetables and chickens from local vegetable vendors and poultry farms as well as from far-off places like Nasik, Pune, and Aurangabad. It has very good markets in Mumbai, Pune, and the surrounding cities. The products are sold under the brand name of Nasta which is a very popular brand among the young collegians and officegoers. It has its most modern kitchen at New Mumbai to cater to the needs for fresh Nasta. Vegetables and chicken items are transported from the procurement centers of Nasik, Pune, and Aurangabad using hired trucks. While transporting vegetables and chickens, there were shortages,</p>	15	K6	CO 4

	<p>damages, and decomposition problems which vary from 10% to 15% and there is inconsistency in the transit time, the reliability of the raw material transporters is very low.</p> <p>The packaging of Nasta is very good and attractive but it is not a long-lasting type. However, the quality and taste are the reasons for its popularity. Nasta is sold in three different packs party, family, and individual.. Nasta loses its taste and flavour after 8 hours if it is not preserved in refrigeration. Nasta is distributed through 25 distribution centres including three at its main procurement centers of Nasik, Pune, and Aurangabad.</p> <p>Logistics Information Network is not up to the mark. The procurement centres directly communicate with the operating centre at Thane. Lack of proper coordination at different distribution centres, it has started creating problems with stocks, spoilage, pilferage, and wastage of raw materials as well as finished goods at certain distribution and procurement centres.</p> <p>Transportation and storage problems are identified as the main culprits for the heavy losses being incurred at some centers. Holidays, festivals, and collegians put a lot of pressure on the existing demand and</p>			
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	<p>supply situations of Nasta seasonally, resulting in mismanagement and losses. The entry of multinationals into the market has increased the competition and put pressure on Nasta. The Managing Director of the company has formed a team consisting of senior executives to suggest a concrete plan to fight the growing competition and overcome problems of transport, storage and other related problems so as to increase the market share and margin.</p> <p>The team of senior executives has recommended your name as a Logistics Consultant. You are required to put forward your suggestions for the following:</p> <p>a) Proper transportation policy to ensure minimum transportation loss of vegetables and poultry products and reduction in the packaging costs. Advice on the company owning its own fleet of transport.</p> <p>b) Demand forecasting techniques to take care of the seasonality as well as a reduction in the inventory, overcoming shortages as well as other related problems.</p> <p>c) Suggestions for improving Purchases and Distribution policies</p>			
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UNIT - V

Unit - V / Part - A / 2 Marks

S. No	Questions	Mark Split up	K – Level	CO
1.	State the role of reverse logistics in the company’s supply chain.	2	K1	CO 1
2.	List out the drivers of “green logistics” initiatives.	2	K1	CO 5
3.	State the reasons to link CRM with SCM.	2	K1	CO 5
4.	Recall the elements of the Logistics Information System.	2	K1	CO 5
5.	Describe the reverse logistics activities that reduce environmental, social, and economic impact.	2	K2	CO 5
6.	Appraise the future trends in green logistics.	2	K5	CO 5
7.	Describe the role of ERP in SCM.	2	K2	CO 5
8.	List out the desired characteristics of LIS.	2	K1	CO 5
9.	Appraise the term “Facility Planning.”	2	K5	CO 5
10.	Describe the importance of logistics information in the Supply Chain.	2	K2	CO 5

Unit - V / Part - B / 13 Marks				
S. No	Questions	Marks Split up	K – Level	CO
1.	Examine the classical BPR approach and its relevance with SCM.	13	K4	CO 5
2.	Explain the concept of green marketing with illustrations. What is its relationship with reverse logistics?	13	K3	CO 5
3.	Identify why the high-tech industry has been the leader in adopting supply chain IT systems. Take a hypothetical organization and how it gains advantage with the help of IT.	13	K3	CO 5
4.	“Reverse logistics, though considered a drain on the company’s profits, can be leveraged as a tool for customer satisfaction in today’s competitive markets” Elucidate	13	K3	CO 5
5.	Explain how “green logistics” strategies can be tuned to a “product life cycle” approach adopted by companies.	13	K3	CO 5
6.	Discuss Agile operations Challenges.	13	K2	CO 5

Unit - V / Part - C / 15 Marks				
S. No	Questions	Marks Split up	K – Level	CO
1.	<p>Case Study</p> <p>Nokia—Reverse Logistics Initiatives for Used Mobile Phones Distribution centers face new challenges daily. One of the major challenges is how to handle the inflow of returns from retail vendors, seasonal goods, damages, excessive inventory, and so on. Reverse logistics is an interesting area for mobile phones. In India every month 6–7 million new mobile handsets are added to the market. Even ahead of China, India now is the top mobile market in the world. Moreover, it is not all about low-end ones, increasing numbers of middle and upper-end mobiles are also being sold. Reverse logistics is an important strategic operational tool in the modern business era. This is particularly important for short-life cycle industries such as the mobile phone industry. As estimated by Nokia, the average life cycle of a mobile handset the world over is 18 months. However, in India, it is about 24–30 months but is shrinking drastically due to the</p>	15	K6	CO 5

<p>changing consumer behaviour. Interestingly, in the war for a market share of new handsets sold, retailers are exchanging old ones for new at their shops. And what happens to the old ones? Even if 30 percent of Indians replace their mobile handsets, that is nearly 80 million a year, there is a huge opportunity for reverse logistics for mobile handset companies here. Nokia has come up with an interesting concept for recycling its phones. It launched its “We Recycle” campaign sometime back. Within this, it has demonstrated how it will make mobiles using recycled aluminum, circuits, and plastic. In Europe, it has started putting up bins in the Nokia Care Centres, where people can dump their old mobiles. Something similar can also be done in India. There are e-waste companies such as Inforek Syscom and Trishiya (bought by SIMS Australia last year) that can recycle mobiles and computers. They get their stuff filtered up through the “kabadi” chain. The theoretical recycling ability of Nokia mobile devices ranges from 65 to 80 percent. Nokia supports the concept of recycling as its drive towards environmental concerns. Nokia is currently developing awareness-building programmes that fit into existing recycling infrastructure and local cultural norms as well as regulatory framework and local legal requirements. Old phones might seem worthless, but</p>			
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	<p>they still contain many usable and valuable materials. Nokia's idea is to make it easier for consumers to act as 'eco-conscious' citizens by offering the possibility to return old, unused phones and accessories. Authorized Nokia sales and service points are all possible channels for returning used products.</p> <p>Equipment sold via Nokia networks is traceable with recycling possibilities included in the commercial contracts. Nokia is offering this service since 1999 in Europe. Currently, efforts in the United States are that pre-addressed, postage-paid envelopes will be included in sales packs, providing the customers with an easy method for returning used products for recycling, at no cost to them. The consumer simply places the contents in the bag and then puts it in the mailbox. In the post-consumer collection, the composition of collected products and materials is verified by professional pre-treatment. For the recycling of obsolete mobile devices and batteries, Nokia selects companies audited through its set of "Requirements for Service Providers."</p> <p>Questions</p> <p>a. Why did Nokia take the initiative of 'reverse logistics' for</p>			
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	<p>used cell phones?</p> <p>b. What are the major issues in reverse logistics?</p> <p>c. How can the “kabadi” network be deployed in the reverse logistics system?</p> <p>d. How can the issue of e-waste be addressed in India?</p>			
2.	<p>Case Study</p> <p>Trans India Freight Services Pvt Ltd. is an Indian arm of Allcargo Global Logistics and has designed on 40-foot equivalent unit high-cube containers for the transportation of cars. These containers will be moved primarily on rails. Currently, around 98 percent of cars’ transport operations are carried on by roadways and the remaining is by railways. The road sector for car transport is highly fragmented. When carrying automobiles on road the speed of the carrier is 20–40 km/hr and they do not travel at night. For example, Delhi to Mumbai takes six to nine days, which results in the holding up of an inventory. The high-multiple handling results in 10 percent of the cars getting damaged during transportation. With the new logistical packaging for car transportation on the rail,</p>	15	K6	CO 5

<p>there will be a significant reduction in transit times and in-transit damages to the cars. In the beginning, the cost of transportation will be comparable to road transportation. However, with the full-fledged operation, the cost will go down by 5 percent and with double stacking, the cost reduction will be 20 percent. In the new packaging system, the cars are placed on ‘trans-rak’, which is a simple, fixed-frame system. It is fitted into 20 ft, 40 ft, 45 ft, 53 ft, and pallet-wide ISO containers ensuring safe, simple, and secure transportation of vehicles in containers (see Figure). It ensures total security in shipping cars directly from the factory to arrive in perfect condition inside and out at the destination. The trans-rak is free from theft, dirt, and weathering; no knocks, dents, or scratches; no road, rail, roro, or quayside handling, simple to operate for containerizing the cars with no special skills. Trans-rak adjusts for all car shapes and is lifted and lowered with a hand-held drill. This was not the first attempt to carry automobiles by rail. Indian Railways has tried it earlier. A few passenger trains were converted into car carriers. However, the venture was financially unviable because carriers did not get returned loads. The success of this packaged transportation depends on the rail infrastructure with dedicated freight corridors.</p>			
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Trans-rak

Questions

- a. Explain the term 'logistical packaging' with regard to the automobile industry.
- b. What is the novel packaging solution offered by Trans India' and why?
- c. How is 'trans-rak' enhancing the performance of the auto logistical system?

Course Outcomes

CO No	Course outcomes	Cognitive Level
20MBO301.1	Understand the concepts of business logistics and supply chain	K1
20MBO301.2	Demonstrate the impact of network design decision models of supply chain	K2
20MBO301.3	Evaluate the effectiveness of inventory decisions based on demand and supply	K3
20MBO301.4	Exhibit how transportation decisions affect supply chain and logistics	K3
20MBO301.5	Acquire knowledge about role of IT on logistics and supply chain	K3

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