UNIT 3

Freight Management

3.0 Unit Overview & Description

The unit is prepared to provide the idea of freight management and selection of transportation mode. It also helps to understand transportation network route planning. It is also giving idea of containerization, factors for its growth and types. To provide better understanding of packaging, unitization principle is discussed, where as material used for logistical packaging is also explained.

Knowledge and Skill Outcomes

This unit is expected to impart the following Knowledge and skill:

- Understanding of freight economy.
- Awareness relating to factors influencing freight cost and route planning.
- Provides exposures to containerization its scope, types and uses.
- Enable to know packaging for safe product handling during logistic operation.
- Understand to know the kind of product used for safe packaging.

Resource Material

1. Bhattacharya, S.K., Logistics Management: S. Chand and Company Ltd., Ram Nagar, New Delhi, Second Edition (2008).
2. Reji Ismail, Logistics Management: Excel Books, New Delhi (2008).
3. Donald J. Bowersox and David J. Closs, Logistics Management: The Integrated Supply Chain Process, TataMcGraw Hill Publishing Company Limited, New Delhi (2004).
4. Coyle, John Edward, J. Bardi and C. John Langley, Jr., The Management of Business Logistics: A Supply Chain Perspective, Mason OH South Western Thomson Learning (2013).

Learning Outcomes

Unit III	Freight Management	Outcomes
3.1	Freight management.	Discuss the factor influencing freight cost, route and planning.
3.2	Transportation networks.	How do safe packaging take place while handling products during logistic operation.
3.3	Containerization.	Explain the meaning of containerization.
3.4	Logistical packaging for cars.	Understand packaging material.

Assessment Plan

Unit III	Topic	Assessment Method	Time Plan	Remarks
3.1	Freight management.	Exercise: Q & A, T or F		
3.2	Transportation networks.	Exercise: T & F Statements, Q & A		
3.3	Containerization.	Exercise: T & F, Activity		
3.4	Logistical packaging for cars.	Exercise: T & F, Q & A		



3.1 Freight Management

The selection of transportation mode depends on the product characteristics and customer service requirements. For example, raw materials are invariably transported in bulk and through cheaper mode of transportation such as rail or sea. The unit value being less, the transportation cost, as percentage of the value of material being transported, is very high. Hence freight reduction through scale economics becomes necessary. However, in case of high-value items, the deliveries required are faster and in smaller consignment with reliability. In this case, with the unit product value being high, the transportation cost as percentage of the product value is not so significant. Hence, faster and costly modes of transportation such as road or air are preferred.

For the logistics manager cost, speed and reliability are the most important factors to select from the available transportation options. The operating characteristics of different transportation modes are given under following heads.

Figure 3.1: Different Transportation Mode

3.1.1 Speed and Availability of Service

Speed of the service is dependent on the time taken to move products from one facility to another and finally to the customer. Speed is often more important than the cost of the service. The slower modes of transportations involve lower transportation cost, and they result in lower service levels. The availability depends on the existing transportation infrastructure and the ability of the mode to serve the given pair of locations. This sometimes becomes a major constraint in speedy delivery and necessitates the usage of inter-modal transportation.

3.1.2 Product Handling

For handling the heavy as well as odd-shaped cargo, special material handling equipments are deployed. These equipments are not available at loading or unloading points because of very low frequency (at the time of project installations only) of usage. Hence, these equipments have to be organized specially. This adds to unit transportation charges of the product.

Review Questions

I. Write True or False against each statements:

a) The selection of transportation mode depends on the product characteristics and customers service requirements.

b) For logistics manager cost, speed and reliability are the least important factors to select from transportation options.

c) Speed is often less important than the cost of the service.

d) For handling the heavy as well as odd-shaped cargo special material handling equipments are deployed.

e) Movement of goods is done through various modes of transportation.

II. Question & Answer:

1. What do you mean by Freight Management?
2. Write down the important factors to select transportation options.

III. Activity:

1. Visit a travel company in your city / town and collect the data of the cost of different routes used for travel purpose and discuss it in the classroom.

Figure 3.2: Sea Freight

3.2 Transportation Networks

Movement of goods from the point of production to the point of consumption is done through various modes of transportation. Depending on the transportation load, number of delivery points, existing distribution centres, product value, frequency of deliver, urgency and the cost economics, different types of networks are used.

3.2.1 Point-to-Point Network

Point-to-Point types of network is quite common for long distance hauls on the national highways. The points of origin and destinations are fixed. Complete truck loading is assured for both ways.

3.2.2 Multiple Delivery Points

Multiple delivery points network is used for round the trip operations, with multiple pickup an delivery points. For example, the delivery of filled bottles and pick-up of empty bottles of soft drinks at multiple points on the fixed route is quite common.

3.2.3 Transhipment Point

Transshipment Points are two local area networks having a common point where loading and unloading takes place for freight consolidation or break bulk. Most of the national transporters maintain two types of fleet, that is vehicles dedicated for national long distance haulage and other ones for catering to local network. The consignment from long distance fleet is transshipped to local vehicles for distribution across the local area.

3.2.4 Hub and Spoke Network

Hub and spoke network arrangement is like a hub and spoke of the wheel. The hub acts like a central feeder point to the distribution centers, which are at the strategic locations spread across the geographical area. The high volume and high speed shipment takes place from hub to distribution centers through the predetermined shortest routed called spokes. The transshipment of consignment is done at distribution centers for distribution across the local area.

3.2.5 Route Planning

For the conservation of precious fuel and saving the transportation time, route planning may be advisory or statutory. The advisory routes are those with less operational problems and shortest distance. The cost of operation of the truck on such routes is the lowest. These are basically national or state highways connected to the markets and traffic on such routes is also high. These are very attractive for the truckers because of the immense opportunities for the return freight business. The statutory routes are those, which legally prohibit a trucker to use the routes other than the designated ones. The statutory routes are designated for carrying the particular type of goods such as explosives, hazardous chemicals or inflammable materials. The other categories of routes are those used for high productivity vehicles, high speed vehicles or extra heavy vehicles. The statutory routes are common in developed countries and quite uncommon in India.

The main objective of route planning is to cover the distance between two points with the shortest distance, ensuring operating economy resulting into lowest transportation cost. To plan a route for a truck for multiple pickups and delivery points, spread over a vast geographical area, is a challenging task. The planning task becomes complicated in case of perishable commodity having short shelf life. Generating distance matrix, which is a one time exercise, and generating the route matrix with nodes for pick-ups and delivery can solve the problem. The other factor is duration of travel in case of perishable products.

Review Questions

I. Question & Answer:

1. Discuss the types of transportation network used in the movement of goods from the points of production to the point of consumption.
2. Write down the main objective of route planning.

II. Write True or False against each statements:

a) Point to point types of network is quite common for long distance hauls on the national highways.

b) Multiple delivery points network is used for single trip operation.

c) Hub and spoke network arrangement is like a hub and spoke of the wheel.

d) Route planning is advised for the conservation of precious fuel.

3.3 Containerization

Containerization is making waves in the transportation of goods, ensuring manifold benefits to the users, transport companies and the country's economy. A container can be defined as a transport device for moving solid or liquid material. It is a case or a tank with adequate strength to be repeatedly used for packing and transportation of the material. The container can be used on several transport modes without material being stuffed, de stuffed or transshipped.

Figure 3.3: Container Boxes

Figure 3.4: A Clear View of a Container

Today containerization is an accepted trend in shipping for international and domestic trade. Initially containers were used for sea transportation, but are now profusely used in inland transportation. It was Malcolm McLean, owner of a huge trucking company in the USA, who conceived the idea of containers in 1956. Containerization in shipping started in the 1960s; the first container shipping being 'Hawaiian Citizen'. It defined the system of port management with vision and strategic planning and developed sophisticated handling facilities. Since then, the container traffic has grown in leaps and bounds, and more than 200 million TEU of 20 ft container were handled world over in 2000-1. This is expected to grow to 417-491 million TEUs by 2001-02, with largest growth being expected in Asia. Globally, containerization is expected to grow at 5 percent in the next 10 years and in Asia at 8-10 percent.

Ports and shipping industry world over has accepted the containerization is the future of shipping and initiated projects for keeping pace with the latest developments. The ship builders have already started building huge container carrier cargo ships having capacity of more than 6000 TEUs. The ports are also gearing up to meet these challenges. Some port such as Heliex, Canada, have already taken action to deepen the container birth for maintaining the draft of at least 52 feet to receive ships with 8000 TEU or above. The containers used for movement of solid cargo are box type construction with side or top opening with twist locking system. These are normally water and air right constructions using steel or aluminium alloy, and are built as per International Standard Organization (ISO) having common sizes as indicated.

Figure 3.5: Ship With Container Boxes

Figure 3.6: Open View Container

3.3.1 The Factors that Contributed to the Growth of Container Traffic are:

- Integration of various modes of transportation - Possible Inter-model transportation.
- Elimination of cargo transshipment leading to speedier delivery service.
- Possible door-to-door service to customers.
- Reduced risk of transit damage and pilferage.
- Substantial reduction in logistical packaging cost of the goods.
- Reduction in distribution cost.

During these days of cost optimization, every stage of physical distribution has considerable significance. This significance gets further augmented with variations in distribution channels, handling methods, modes of transport, transshipments, storage conditions and extremes of environment. As the distribution aspects of the products are influenced by the above factors, the design of logistical packaging should interface effectively with all the concerned functional areas and ensure itself to adapt to material handling system available. It provides optimum cubic capacity utilization of warehouse area and carrier, convenience of inventory keeping and fulfils the basic need to minimize the chances of product damager. Logistical packaging is appropriately identified as an aid in the distribution network. It has to qualitatively and quantitatively fulfill the required expectations and also be environmentally responsible.



Review Questions

I. Write True or False against each statements:

1. A container can be defined as a transport device for moving solid or liquid material.
2. Today containerization is a rejected trend in shipping for international and domestic trade.
3. Malcolm McLean conceived the idea of containers in 1956.
4. Helix is a port situated in U.S.A.
5. Possible door to door service is an important factor to contribute to the growth of container.

II. Activity:

1. Visit a transport company in your city / town to find the types of containers used by it in its trade and discuss in the classroom.

Container Specification

Type of Container	Interior Dimension (mm)	Door Opening (mm)	Load Capacity (m^3)	Cargo Loadable (m^3)	Max Payload (Kg)	Container Weight (Kg)	Max Gross (Kg)
20 FT DRY CONTAINER	L: 5,897 W: 2,348 H: 2,385	W: 2,337 H: 2,272	33,0		28,190	2,290	30,480
40 FT DRY CONTAINER	L: 12,301 W: 2,348 H: 2,385	W: 2,337 H: 2,272	67,4		26,710	3,770	30,480
40 FT ALUM. DRY CONTAINER	L: 12,057 W: 2,344 H: 2,382	W: 2,337 H: 2,280	67,3		27,530	2,950	30,480
40 FT H.C. DRY CONTAINER	L: 12,031 W: 2,348 H: 2,690	W: 2,337 H: 2,577	76,0		26,490	3,990	30,480
45 FT H/C DRY CONTAINER	L: 13,555 W: 2,348 H: 2,690	W: 2,337 H: 2,577	85,6		25,600	4,880	30,480
40 FT ALUM. REFEER CONTAINER	L: 11,556 W: 2,290 H: 2,238	W: 2,290 H: 2,204	59,2	55,3	27,960	4,520	32,480
40 FT H/C ALUM. REFEER CONTAINER	L: 11,585 W: 2,290 H: 2,527	W: 2,290 H: 2,491	67,0	64,3	28,340	4,160	32,500
40 FT H/C STEEL REFEER CONTAINER	L: 11,583 W: 2,290 H: 2,538	W: 2,290 H: 2,508	67,3	63,3	27,700	4,800	32,500
20 FT STEEL REFEER CONTAINER	L: 5,455 W: 2,290 H: 2,262	W: 2,290 H: 2,227	28,3	26,4	21,040	2,960	24,000
20 FT OPEN TOP CONTAINER	L: 5,898 W: 2,346 H: 2,354	W: 2,338 H: 2,244	32,6		21,550	2,450	24,000
40 FT OPEN TOP CONTAINER	L: 12,022 W: 2,346 H: 2,381	W: 2,337 H: 2,244	66,4		26,460	4,020	30,480
20 FT FLAT TRACK CONTAINER	L: 5,958 W: 2,018 H: 2,077		25,0		27,760	2,720	34,00
40 FT FLAT TRACK CONTAINER	L: 11,986 W: 2,236 H: 1,968		52,7		39,020	5,980	45,000

Figure 3.7

Figure 3.8: Different Forms of Packaging

Figure 3.9: Juice in Tetra Pack

3.3.2 Consumer Versus Logistical Packaging

Packaging is a marketing tool and is related to the performance of marketing function. It is primarily a delimitation of space and setting aside of a product from external environment. Packaging forms the important cost element of the goods and represents 5-30 percent of the value of the goods depending on the product type. Packaging can be divided into two categories, that is consumer and logistical packaging. The consumer or product packaging is basically done for convenience, market appeal and protecting the product from the effects of natural elements. However, logistical or industrial packaging is a very critical element in the physical distribution process. Product packaging is designed to meet marketing objectives, but logistical packing is designed while keeping in view the distribution objectives.

3.3.3 Packaging as Unitization

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 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.

3.3.4 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 transshipment handling. This is the most common method of load unitization for long-distance shipments because ofthe following reasons:

- Excellent protection from environmental effects.
- Space economies.
- Substantial reduction in transit damages.
- Reduction in pilferages.
- Facilitate inter-modal transportation.



3.3.5 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. The two-way pallets are handled by forklift from two sides, while four-way pallets have greater flexibility in being handled by forklift.

3.3.6 Slip-Sheet

Unitization of load is also done on the slip-sheet, which lies flat on the floor. It is a disposable shipping platform constructed out of high-tensile laminated paper. The sheet is much thinner than the wooden pallet. It cannot be lifted with forklift. However, it requires a special lifting device known as push / pull attachment. The device is designed to grip the tabs of the slip-sheet to lift it and load on to the metal plates that support the load during transportation.

Sizes of slip-sheets are similar to the pallets sizes as indicated earlier. However, the product characteristics, capability of handling equipment and the type of transportation equipment will be the deciding factors for unit load platform size.

3.4 Logistical Packaging for Cars

For safe dispatch of the Maruti cars, the company first used side open trailer, accommodating 11 cars. They found damages caused to the cars by miscreants and also cars hitting each other due to lesser distance between the humpers. The system was modified by providing side grills to the trailer and reducing the number of cars to 10. Not satisfied with the modification, company introduced TR-7 truck, a two-in-one customized logistical packaging arrangement and transportation mode. TR-7 truck carries seven cars and is equipped with self-unloading ramp and stoppers in between the loaded cars to avoid collusions during transportation. For shipment of cars for export, the company used bod containers, which used to bring parts and components from foreign suppliers to the factory. The use of containers bringing imported material was a zero cost option for export shipment resulting into substantial saving on the transportation cost.

3.4.1 Packaging Material



For logistical packaging variety of materials are in use., However the most common are follows:

Corrugated Fibreboard

The matter cartons are invariably made out of two to three ply corrugated sheets. However, for logistical packaging, thicker corrugated sheets with five to six ply or more are preferred. This material is most commonly used for consumer durables such as television sets, washing machines, refrigerators, pharmaceutical products, liquor, cigarettes, matches, personal care items, light engineering goods, paints and electronics goods. The pallets are also made out of thin corrugated sheets. However, these pallets are used for very light goods in electronic, plastic and foam manufacturing industries.

The present consumption of corrugated boards in India is to the tune of 3,20,000 tonnes per annum, which is divided among above industries. Largest consumer is the food processing industry.

Review Questions

I. Write True or False against each statements:

1. Packaging is a marketing tool.
2. Packaging can be divided into one category.
3. The physical distribution process involves storage, handling and transportation of the product.

4. Handling of pallets is done with fork lift truck.

5. The matter cartons are invariably made out of two to three ply corrugated sheets.

II. Question & Answer:

1. Write down the types of packaging material used for packaging.

Steel

The metal containers- boxes or drums made out of galvanized mild steel sheets are used for logistical packaging. This strong material can withstand abuse in handling during transit. The usage of this material is recommended for products like chemicals or lubricants wherein strong packaging material, which is less prone to damages during transit due to abuse in handling, is required. Due to higher strength of material, the spilling over or leakages are reduced.

Steel is commonly used for box containers used in multi-modal transportation by sea, rail or road. These containers are made out of thick alloy steel grade sheets for durability and high strength.

Plastics

Plastic bags and containers are quite common in logistical packaging. Plastic drums are used for transporting liquid chemicals, while bags are used for chemicals in solid form and food grains packaging. The high-density plastics are used for rigid lidded containers for storage and transportation of small items. Plastic straps are used for unitizing the material in small packs to be stuffed into a large box container.

Shrink plastic are used for securing and protecting the unitized load on the pallets or skids. Shrink packaging is very cost-effective as compared to the rigid plastic containers. However, it is not reusable and being non-biodegradable material creates problem for disposal.

The pallets made out of high-density polyethylene (HDPE) are commonly used in application wherein properties of chemical and impact resistance are preferred. However, polyethylene has very poor resistance to bending. Polystyrene or polypropylene is also occasionally used for certain product applications.

Wood

Wood is the most common material used for construction of pallets or crates. The pallets are designed to take loads up to 2,200 kilogram using hard wood. Soft wood may be used for weight carrying capacity up to 2,000 kilogram. The wooden pallets are cheaper as compared to metal or plastic pallets.

Globally, wooden pallets are preferred and used for both in house and shipping application Investment in pallets is a costly affair and hence is used on a limited scale. In many cases,

the users and the pallet supplier create pallet pool for reusing the pallets, and thus reduce the recurring investment and resolve the problem of waste disposal.

To survive in today's competitive markets, companies are focusing on their core competencies and adopting outsourcing as a strategic solution to improve quality of service and reduce cost of important as well as non-core processes. Using the strategic partnership of third-party logistics service providers, in integrated logistics, companies the world over reported gains such as reduction in logistics costs, logistics assets and order cycle time. Today, it is an accepted trend in the industry to form a collaborative relationship with the logistics service provider for knowledge based supply chain integration that rests on IT as the backbone.

Figure 3.10: Corrugated Board

Figure 3.11: Medicine Packaging in Bottles

3.5 Summary

The unit discusses the freight management which includes selection of transportation mode, transportation cost. It also tells about the different types of transportation networks. The other aspects like route planning and movements of goods through containers is also elaborated with reasons. Unit also focused on packaging of different goods which is readily used in logistical purposes.

3.6 Exercise

1. What do you mean by freight management?
2. Write down the important factors used to select the transportation options in logistics.
3. Discuss the different transportation networks for the movement of goods.
4. Why do we need route planning? What is its objective?
5. What is containerization process? Discuss the factors contributing in the growth of containers?
6. Write down the different types of containers.

7. Why logistical packaging is so important?

8. For what purpose packaging is called as load unitization?

9. Explain in brief the different material used for packaging.

3.7 Practical

1. Visit a packaging company in your city / town and prepare a note on material used in making different package to discuss in the classroom.

2. Collect pictures of different containers through various media and paste in a file. Discuss it in the classroom telling its utility.

3. Prepare a note on different types of packets found in home while buying goods and discuss the material used in making it.