

CHAPTER ELEVEN

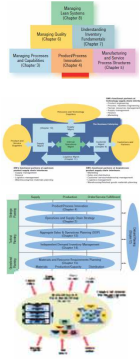
Logistics Management

McGraw-Hill/Irwin

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Where We Are Now

Chapter	Relationships	Sustainability	Globalization	Organizational Culture/Ethics	Change Management	Measurement
Part 1 Supply Chain: A perspective for Operations Management						
1. Introduction to Managing Operations Across the Supply Chain	X	X	X			
2. Operations and Supply Chain Strategy	X	X	X	X	X	X
Part 2 Foundations of Operations Management						
3. Managing Processes and Capabilities	X					X
4. Product/Process Innovation	X	X	X		X	
5. Manufacturing and Service Process Structures	X		X	X		X
6. Managing Quality	X	X	X	X	X	X
7. Understanding Inventory Fundamentals	X		X			X
8. Lean Systems	X		X	X	X	X
Part 3 Integrating Relationships Across the Supply Chain						
9. Customer Management	X					X
10. Supplier Management	X	X	X	X		X
11. Logistics Management	X	X	X			
Part 4 Planning of integrated Operations Across the Supply chain						
12. Demand Planning: Forecasting and Demand Management	X		X			X
13. Sales and Operations Planning	X		X			X
14. Independent Demand Inventory Planning	X					X
15. Materials and Resource Requirements Planning	X		X			X
Part 5 Managing Change in Supply Chain Operations						
16. Project Management	X	X	X	X	X	X
17. Evolving Business Models and Change Drivers in the Supply Chain	X	X	X	X	X	X



11-2

Learning Objectives

1. Explain logistics and major managerial decisions
2. Explain role of government in transportation
3. Describe impact of consolidation on cost
4. Describe carrier selection process
5. Explain roles and activities of warehousing and distribution
6. Explain importance of packaging and materials handling
7. Explain network design decisions
8. Describe benefits of integrated service providers

11-3

Logistics Management

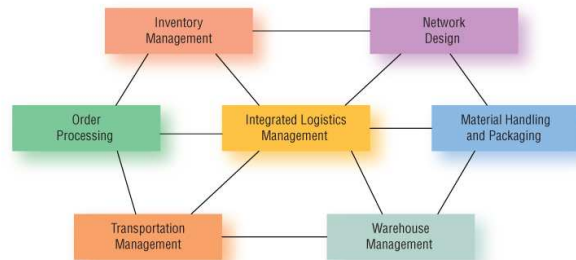
- **Logistics Management:** movement and storage of materials to meet customer needs and organizational objectives
 - Includes forward and reverse flow
 - Includes flow of materials and information
 - Load, offload, move, sort and select material



11-4

Activities of Integrated Logistics Management

FIGURE 11-1 The Activities of Integrated Logistics Management



¹See the organization's Web site at: www.esemp.org.

Figure 11-1

11-5

Logistics Cost Minimization & Trade-offs

- **Cost-to-Service:** ↑ service levels = ↑ costs
- **Cost-to-Cost:** ↑ cost of one activity, ↓ of another
- **Total Landed Cost:** sum of all product and logistics related costs
 - Country costs of manufacturing
 - Cost in transit to country of sale
 - Cost within country of sale

11-6

Transportation Management

- Government's Role:

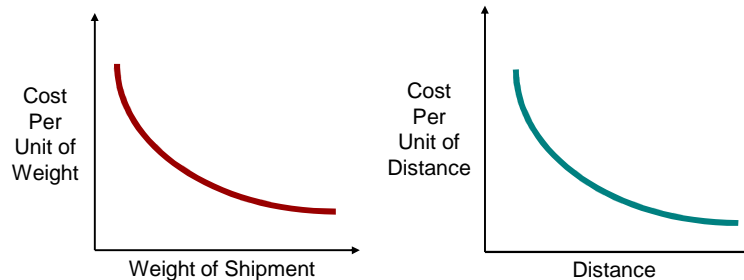
- **Economic Regulation:** entry of new carriers, rates and services provided
- **Safety Regulation:** safe for carriers and public, including increased emphasis on security from terrorist activity

11-7

Transportation Management

Transportation Economics:

- **Economy of Scale:** cost per unit of weight decreases as shipment size increases
- **Economy of Distance:** cost per unit traveled decreases as distance moved increases



11-8

Consolidation

- **Consolidation:** one large shipment made of many smaller shipments
 - By **Market Area:** combine small shipments from one shipper going to the same area
 - **Pooled Delivery:** combine small shipments from different shippers going to the same area
 - **Scheduled Delivery:** delivery at specific times

11-9

Consolidation

A firm has orders of 12,000/lbs each of goods for three customers. It is \$15.75 per hundredweight (cwt) to ship direct, or \$10.50 cwt for shipments of greater than 30,000/lbs with a \$300 fee for each stop.

Cost of individual shipments:

$$\begin{aligned} \$15.75 \times (12,000/100) &= \$15.75 \times 120\text{cwt} = \$1,890 \\ \text{total for all three shipments} &= 3 \times \$1,890 = \mathbf{\$5,670} \end{aligned}$$

Consolidated shipments:

$$\begin{aligned} \$10.50 \times (36000/100) &= \$10.50 \times 360\text{cwt} = \$3,780 \\ \text{including stop charge} &= 3 \times \$300 + \$3,780 = \mathbf{\$4,680} \\ \text{Saving with consolidation} &= \$5,670 - \$4,680 = \mathbf{\$990} \end{aligned}$$

Example 11-1 11-10

Transportation Modes

Cost, speed and flexibility trade-offs

Shipments are often *Intermodal*

Operating Characteristics	Truck	Rail	Water	Pipe	Air
Speed	2	3	4	5	1
Availability	1	2	4	5	3
Dependability	2	3	4	1	5
Capability	3	2	1	5	4
Frequency	2	4	5	1	3
Cost	2	3	4	5	1

1=best, highest; 5=worst, lowest

Figure 11-2

11-11

Carrier Types

- **Value Density:** ratio of value to weight, often determines the type of carrier used
 - **Common:** provide service to the public with published rates
 - **Contract:** provide service only to select, contracted customers
 - **Private:** firm owns its own equipment

11-12

Transportation Service Selection

A firm must ship a 10lbs parcel of 30 items valued at \$500 each a distance of 1,000 miles. Transportation options are 8-day ground for \$50 or 2-day air for \$90. Holding cost is 20% of product value. How should the firm ship their product?

Total cost = In-transit holding cost + Freight cost

In-transit holding = days in transit/365 x value x holding cost

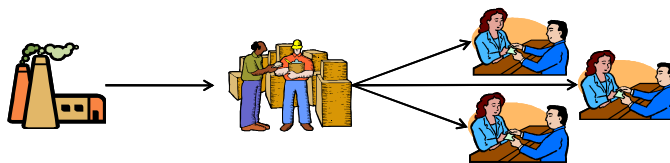
Ground: $[(8\text{days}/365) \times \$15,000 \times 20\%] + \$50 = \115.74

Air: $[(2\text{days}/365) \times \$15,000 \times 20\%] + \$90 = \106.44

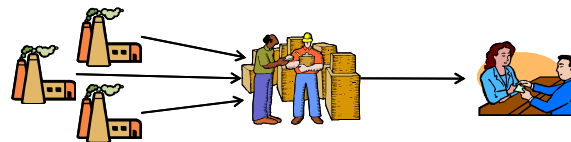
Example 11-2 11-13

Warehouse Management cont'd

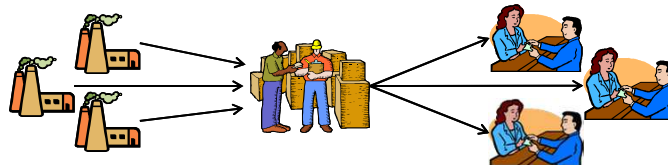
Break-Bulk



Consolidation



Cross-Docking



11-14

Warehouse Management cont'd

- **Reverse Logistics:**

- Material moves upstream in the supply chain
- Especially important in online retail



(www.zappos.com)

- **Value Added Services:** providing additional value to the customer, such as postponement

11-15

Warehouse Management cont'd

- **Warehouses must perform a variety of operations on a daily basis:**

- Receiving and unloading
- In-storage handling
- Storage
- Order picking
- Staging
- Shipping

11-16

Materials Handling and Packaging

- Handling material increases costs and risk of damage
- Packaging can decrease handling costs and risk of damage
 - **Containerization or Unitization**: filling or creating a larger container from smaller ones
 - **Automated Storage and Retrieval Systems**: robots that get, move and put-away material
 - RIFD: electronic tracking of material

11-17

Network Design

- Most impact on supply chain operations
- Multiple factors to consider
 - Labor
 - Proximity to suppliers and customers
 - Cost of land and construction
 - Taxes, incentives and regulations
 - Infrastructure
 - Quality of life for employees



11-18

Network Design cont'd

- **Center of Gravity Method:** finds the lowest cost based on demand and distance, using X,Y coordinates to define a geographic position

$$X^* = \frac{\sum_i D_i X_i}{\sum_i D_i} \quad Y^* = \frac{\sum_i D_i Y_i}{\sum_i D_i}$$

D_i = Demand at location i
 X_i = X coordinate at location i
 Y_i = Y coordinate at location i



11-19

Network Design cont'd

<u>Location</u>	<u>X coordinate</u>	<u>Y coordinate</u>	<u>Weight Shipped</u>
A	20	90	200,000 lbs
B	95	75	100,000 lbs
C	60	30	500,000 lbs

$$X^* = \frac{20(200,000) + 95(100,000) + 60(500,000)}{200,000 + 100,000 + 500,000} = \frac{43,500,000}{800,000}$$

$$= 54.375$$

$$Y^* = \frac{90(200,000) + 75(100,000) + 30(500,000)}{200,000 + 100,000 + 500,000} = \frac{40,500,000}{800,000}$$

$$= 50.625$$

Example 11-3 11-20

Network Design cont'd

FIGURE 11-4
Coordinate Locations
of Markets and Their
Center-of-Gravity

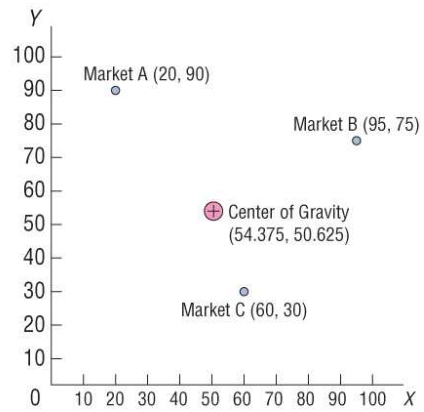


Figure 11-4 11-21

Network Design cont'd

- Number of locations is determined by balancing inbound and outbound transportation costs

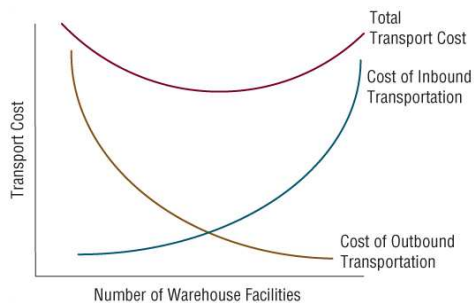


FIGURE 11-5 Trans-
portation Cost Related
to Number of Ware-
house Locations

Figure 11-5 11-22

Network Design cont'd

FIGURE 11-6 Total Network Cost

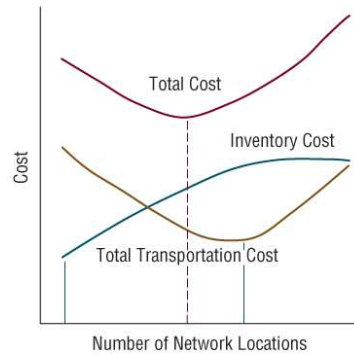


Figure 11-6

11-23

Logistics Management Summary

1. Flow of material and information between suppliers, producers and customers
2. Meet customer needs at lowest landed cost
3. Includes multiple decision areas
4. Economies of scale and distance impact costs
5. Multiple warehouse type to facilitate material storage and flow
6. Network design and facility location impact costs and customer service

11-24