

Supply Chain Analytics

Lecture 8: Transportation management in supply chain

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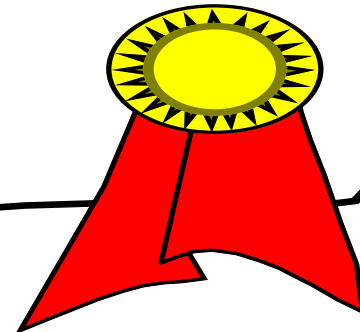
Learning Objectives

- ❖ **To understand the escalating importance of logistics and supply-chain management as crucial tools for competitiveness.**
- ❖ **To learn about materials management and physical distribution.**
- ❖ **To learn why international logistics is more complex than domestic logistics.**
- ❖ **To see how the transportation infrastructure in host countries often dictates the options open to the manager.**
- ❖ **To learn why international inventory management is crucial for success.**



International Logistics

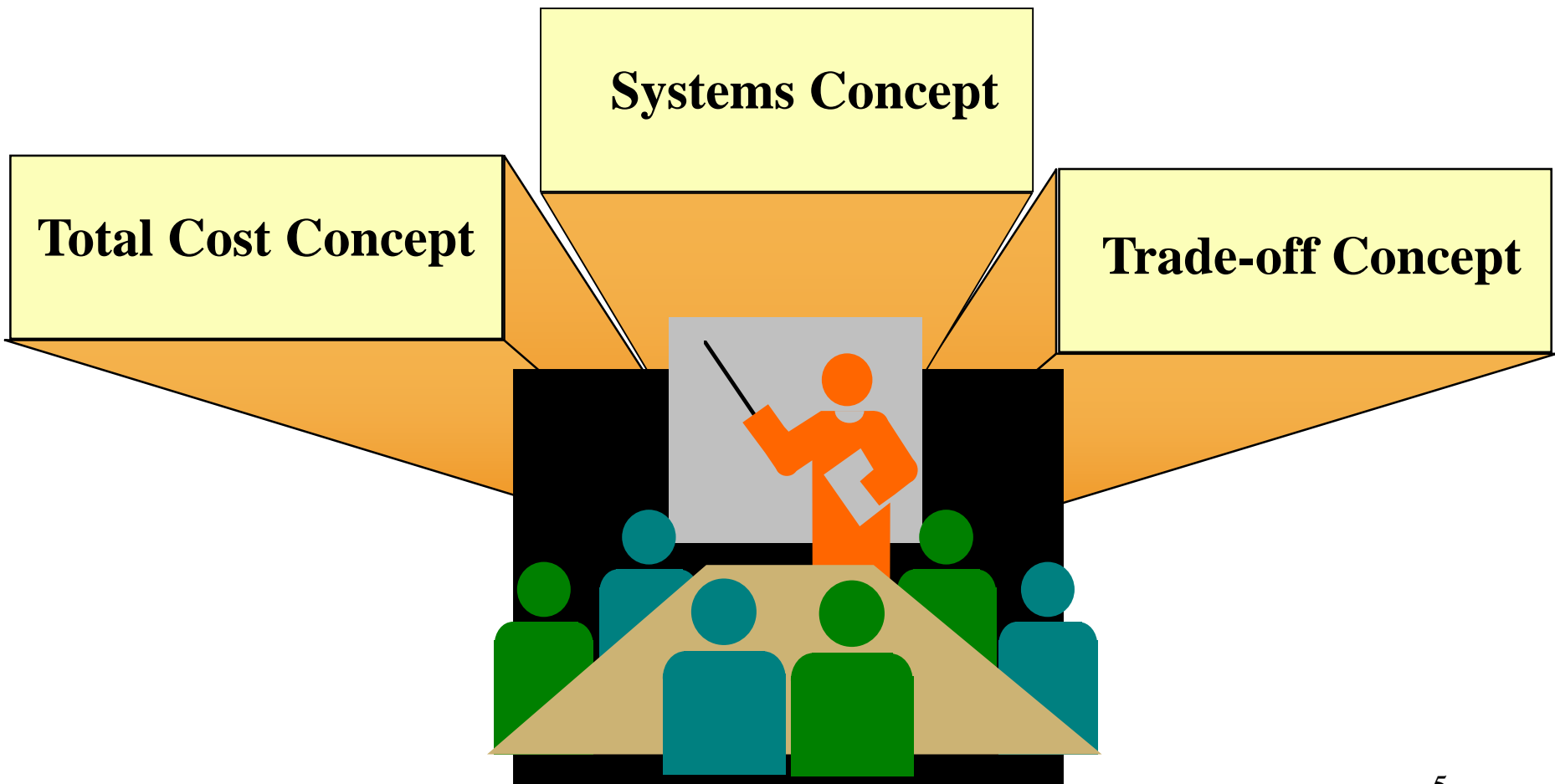
International logistics is the design and management of a system that controls the forward and reverse flow of materials, services, and information into, through, and out of the international corporation.



International Logistics (cont.)

- ❖ **Through the implementation of international logistics, the firm can implement cost-saving programs such as just-in-time (JIT), electronic data interchange (EDI), and early supplier involvement (ESI).**
- ❖ **The two phases of the movement of materials include:**
 - ❖ materials management, or the timely movement of materials, parts, and supplies.
 - ❖ physical distribution, or the movement of the firm's physical product to its customers.

Three Concepts of Business Logistics

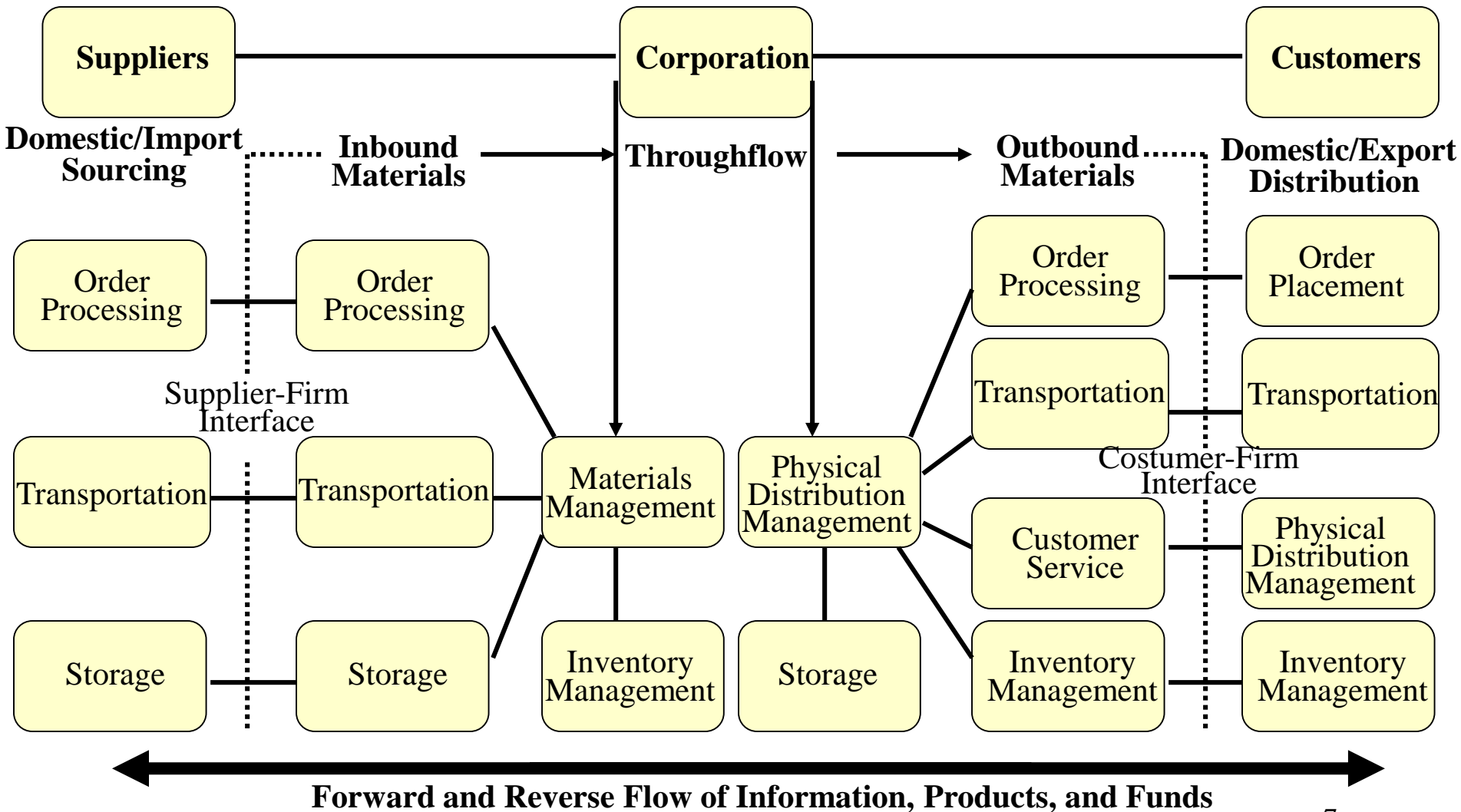


Supply-Chain Management

❖ **Supply-chain management is the integration of business processes from end user through original suppliers, that provide products, services, and information that add value for customers.**

- ❖ Supply-chain management connects a company's supply side with its demand side.
- ❖ It opens up supplier relationships for companies outside of the buyer's domestic market.

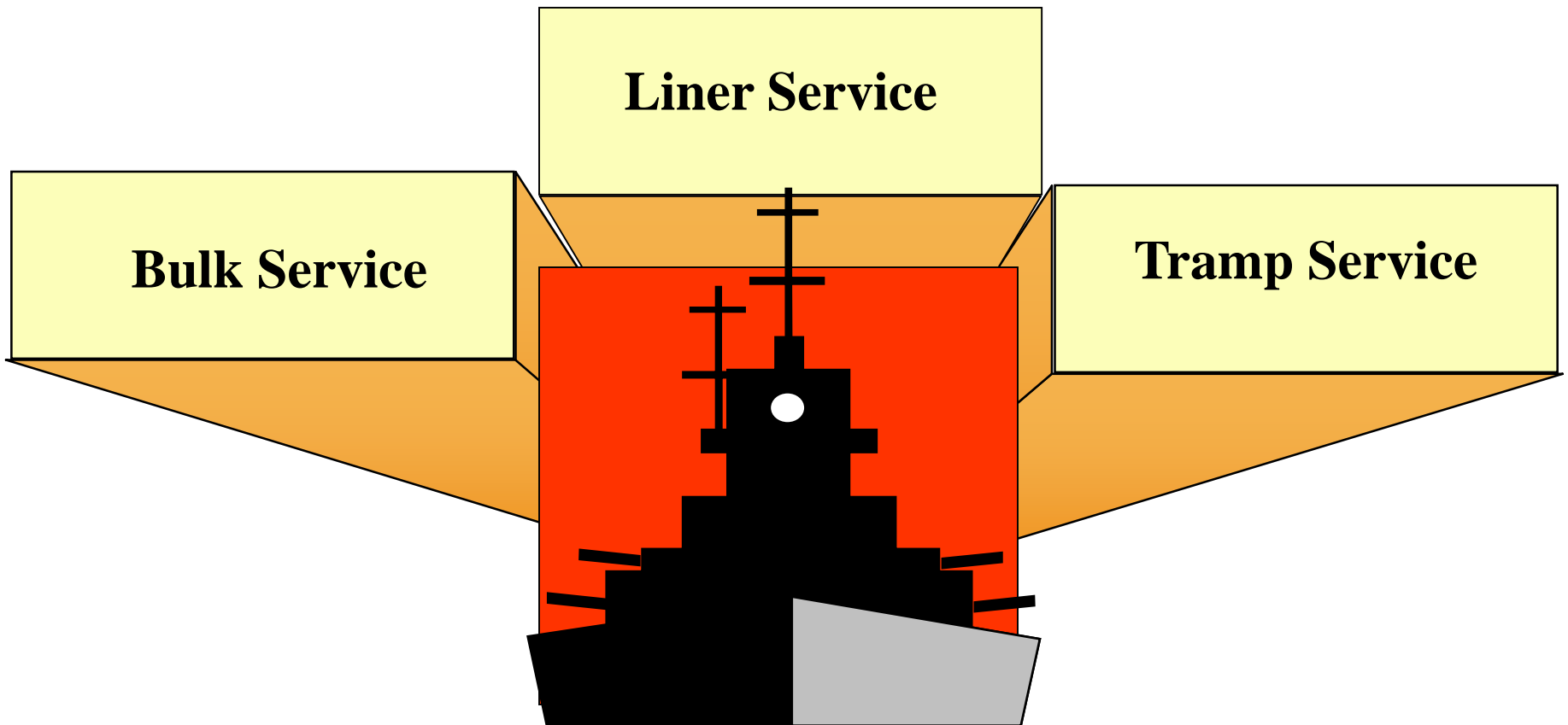
The International Supply Chain



Transportation Infrastructure

- ❖ **A firm's logistics platform is determined by a location's ease and convenience of market reach under favorable cost circumstances.**
- ❖ **The public sector's investment priorities, safety regulations, tax incentives, and transport policies can have major effects on the logistics decisions of firms.**
- ❖ **The logistics manager must learn about existing and planned infrastructures abroad and at home and factor them into the firm's strategy.**

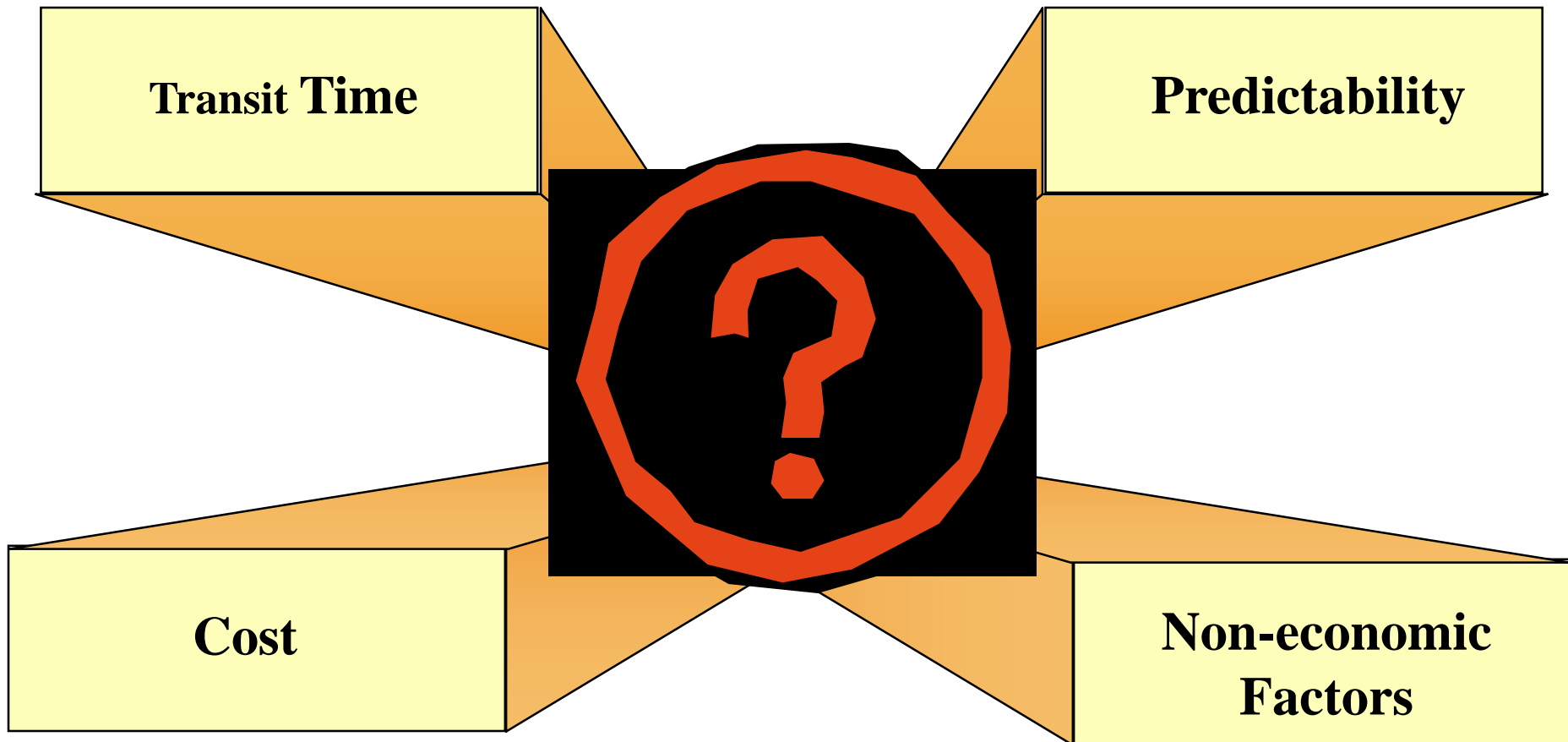
Vessels Used in Ocean Shipping



Airfreight

- ✦ **Airfreight** is available to and from most countries, including the developing world.
- ✦ International airfreight is expected to grow to 190 billion tons in 2005, compared to only 70 billion tons in 1995.
- ✦ Forty percent of the world's manufactured travel by air.
- ✦ Items that are high-value or high in **density** tend to travel by air.

Considerations for Selecting a Mode of Transport



Export Documentation

- ❖ A **bill of lading** is a contract between the exporter and the carrier indicating that the carrier has accepted responsibility for the goods and will provide transportation in return for payment.
- ❖ A **commercial invoice** is a bill for the goods stating basic information about the transaction, including a description of the merchandise, total cost of the goods sold, addresses of the shipper and seller, and delivery and payment terms.
- ❖ A **freight forwarder** specializes in handling export documentation.

International Inventory Issues

- ❁ **Inventories tie up a major portion of corporate funds, therefore proper inventory policies should be a major concern to the international logistician.**
- ❁ **Just-in-time inventory policies minimize the volume of inventory by making it available only when needed.**
- ❁ **The purpose of establishing inventory systems are:**
 - ❁ to maintain product movement in the delivery pipeline
 - ❁ to have a cushion to absorb demand fluctuations

Three Factors that Decide the Level of Inventory

Order Cycle Time

Desired Customer Service Levels

Use of Inventories as a Strategic Tool



International Packaging Issues

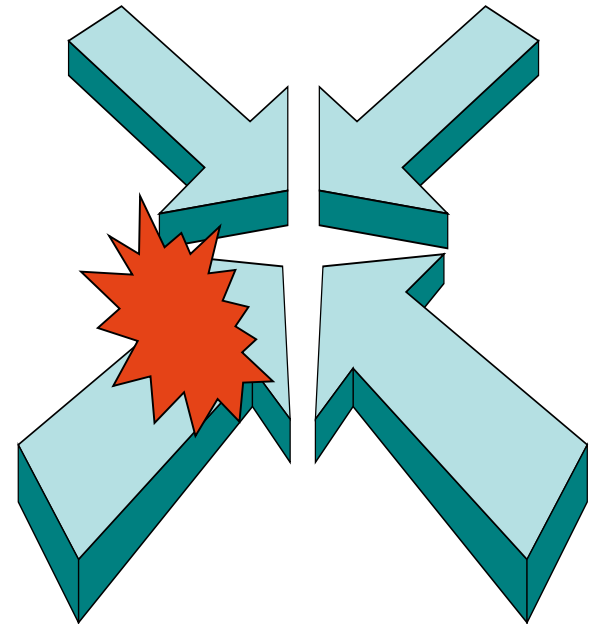
- ✦ Packaging is instrumental in getting the merchandise to the destination in a safe, presentable condition.
- ✦ Because of the added stress of international shipping, packaging that is adequate for domestic shipping may be inadequate for international shipping.
- ✦ Packaging considerations that should be taken into account are environmental conditions and weight.
- ✦ One solution to the packaging problem has been the development of inter-modal containers.
- ✦ Cost attention must be paid to international packaging.

Storage Facilities

- ⊕ A stationary period is involved when merchandise becomes inventory stored in warehouses.
- ⊕ The **location decision** addresses how many distribution centers to have and where to locate them.
- ⊕ Storage facilities abroad can differ in availability and quality.
- ⊕ The logistician should analyze international product sales and then rank order products according to warehousing needs.

Special Trade Zones

- ❖ **Foreign trade zones** are areas where foreign goods may be held or processed and then re-exported without incurring duties.
- ❖ Trade zones can be useful as transshipment points to reduce logistics cost and redesign marketing approaches.
- ❖ Governments and firms benefit from foreign trade zones.



Export Processing Zones and Economic Zones

- ❖ In **export processing zones**, special rules apply that are different in other regions of the country.
- ❖ These zones usually provide tax-free and duty-free treatment for production facilities whose output is destined abroad.
- ❖ The **maquiladoras** of Mexico are one example of a program that permits firms to take advantage of sharp differentials in labor costs.
- ❖ Through the creation of **special economic zones**, the Chinese government has attracted many foreign investors bringing in millions of dollars.

Centralized Logistics Management

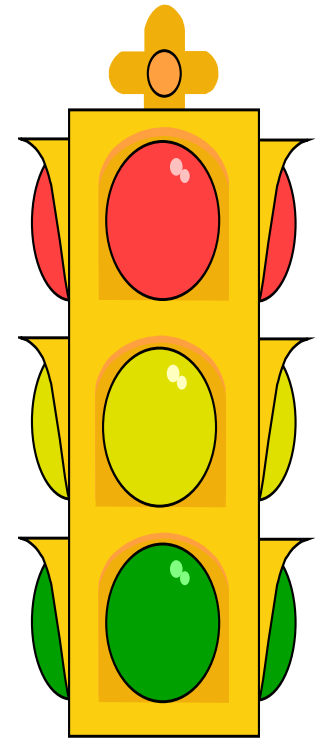
- ❖ **In international logistics, the existence of a headquarters staff that retains decision-making power over logistics is important.**
- ❖ **To avoid internal problems, both headquarters staff and local management should report to one person.**
- ❖ **This individual can contribute an objective view when inevitable conflicts arise in international logistics coordination.**

Decentralized Logistics Management

- ❖ **When a firm serves many diverse international markets, total centralization might leave the firm unresponsive to local adaptation needs.**
- ❖ **If each subsidiary is made a profit center in itself, each one carries the full responsibility for its performance.**
- ❖ **Once products are within a specific market, increased input from local logistics operations should be expected and encouraged.**

Outsourcing Logistics Services

- ❖ The systematic outsourcing of logistics capabilities is a third option.
- ❖ By collaborating with transportation firms, private warehouses, or other specialists, corporate resources can be concentrated on the firm's core product.
- ❖ One-stop logistics allows shippers to buy all the transportation modes and functional services from a single carrier.



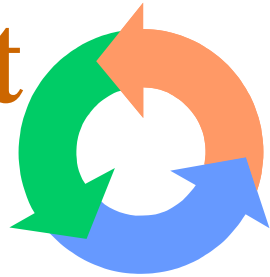
The Supply Chain and the Internet

- ❖ **Because of the internet, firms are able to conduct many more global comparisons among suppliers and select from a wider variety of choices.**
- ❖ **When customers have the ability to access a company through the internet, the company must be prepared for 24-hour order-taking and customer service.**
- ❖ **For all countries, but particularly in developing nations, the issue of universal access to the internet is crucial.**

Logistics and Security

- ❖ **After the terrorist attacks of 2001, companies have to deal with the fact that the pace of international transactions has slowed down and that formerly routine steps will now take longer.**
- ❖ **Logistics systems and modern transportation systems are often the targets of attacks.**
- ❖ **The need to institute new safeguards for international shipments will affect the ability of firms to efficiently plan their international shipments.**

Logistics and the Environment



- ✦ **Since environmental laws and regulations differ across the globe, the firm's efforts need to be responsive to a wide variety of requirements.**
- ✦ **Reverse distribution systems are instrumental in ensuring that the firm not only delivers the product to the market, but also can retrieve it from the market for subsequent use, recycling, or disposal.**
- ✦ **Companies need to learn how to simultaneously achieve environmental and economic goals.**

Example: Ponderosa Development Corp.

Ponderosa Development Corporation (PDC) is a small real estate developer operating in the Rivertree Valley. It has seven permanent employees whose monthly salaries are given in the table on the next slide.

PDC leases a building for \$2,000 per month. The cost of supplies, utilities, and leased equipment runs another \$3,000 per month.

PDC builds only one style house in the valley. Land for each house costs \$55,000 and lumber, supplies, etc. run another \$28,000 per house. Total labor costs are figured at \$20,000 per house. The one sales representative of PDC is paid a commission of \$2,000 on the sale of each house. The selling price of the house is \$115,000.

Example: Ponderosa Development Corp.

<u>Salary</u>	<u>Employee</u>	<u>Monthly</u>
	President	\$10,000
	VP, Development	
6,000		
	VP, Marketing	4,500
	Project Manager	
5,500		
	Controller	4,000
	Office M	3,000

Example: Ponderosa Development Corp.

⊕ Question:

Identify all costs and denote the marginal cost and marginal revenue for each house.

⊕ Answer:

The monthly salaries total \$35,000 and monthly office lease and supply costs total another \$5,000. This \$40,000 is a monthly fixed cost.

The total cost of land, material, labor, and sales commission per house, \$105,000, is the marginal cost for a house.

The selling price of \$115,000 is the marginal revenue per house.

Example: Ponderosa Development Corp.

✚ Question:

Write the monthly cost function $c(x)$, revenue function $r(x)$, and profit function $p(x)$.

✚ Answer:

$$c(x) = \text{variable cost} + \text{fixed cost} = 105,000x + 40,000$$

$$r(x) = 115,000x$$

$$p(x) = r(x) - c(x) = 10,000x - 40,000$$

Example: Ponderosa Development Corp.

⊕ Question:

What is the breakeven point for monthly sales of the houses?

⊕ Answer:

$$r(x) = c(x) \text{ or } 115,000x = 105,000x + 40,000$$

Solving, $x = 4$.

⊕ Question:

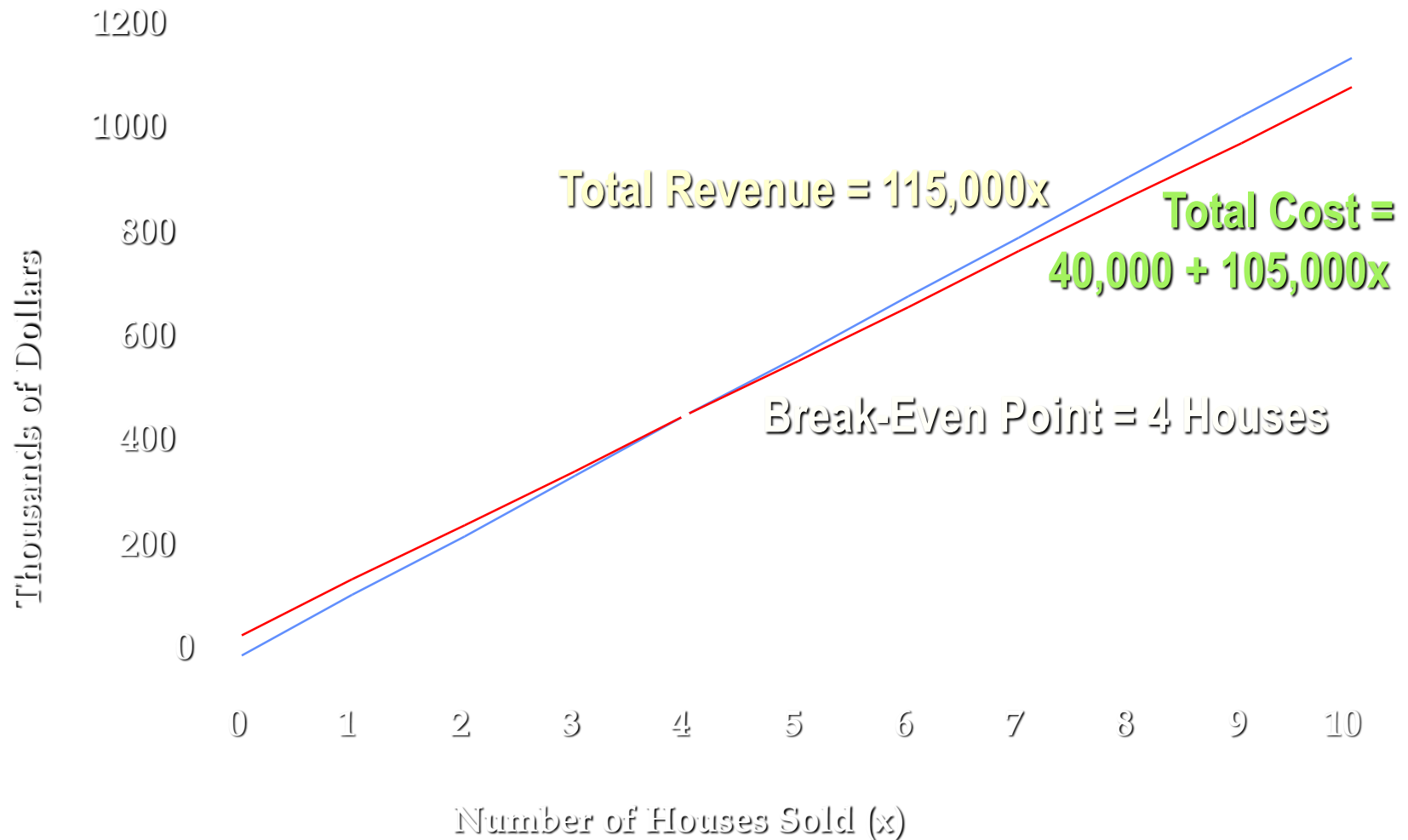
What is the monthly profit if 12 houses per month are built and sold?

⊕ Answer:

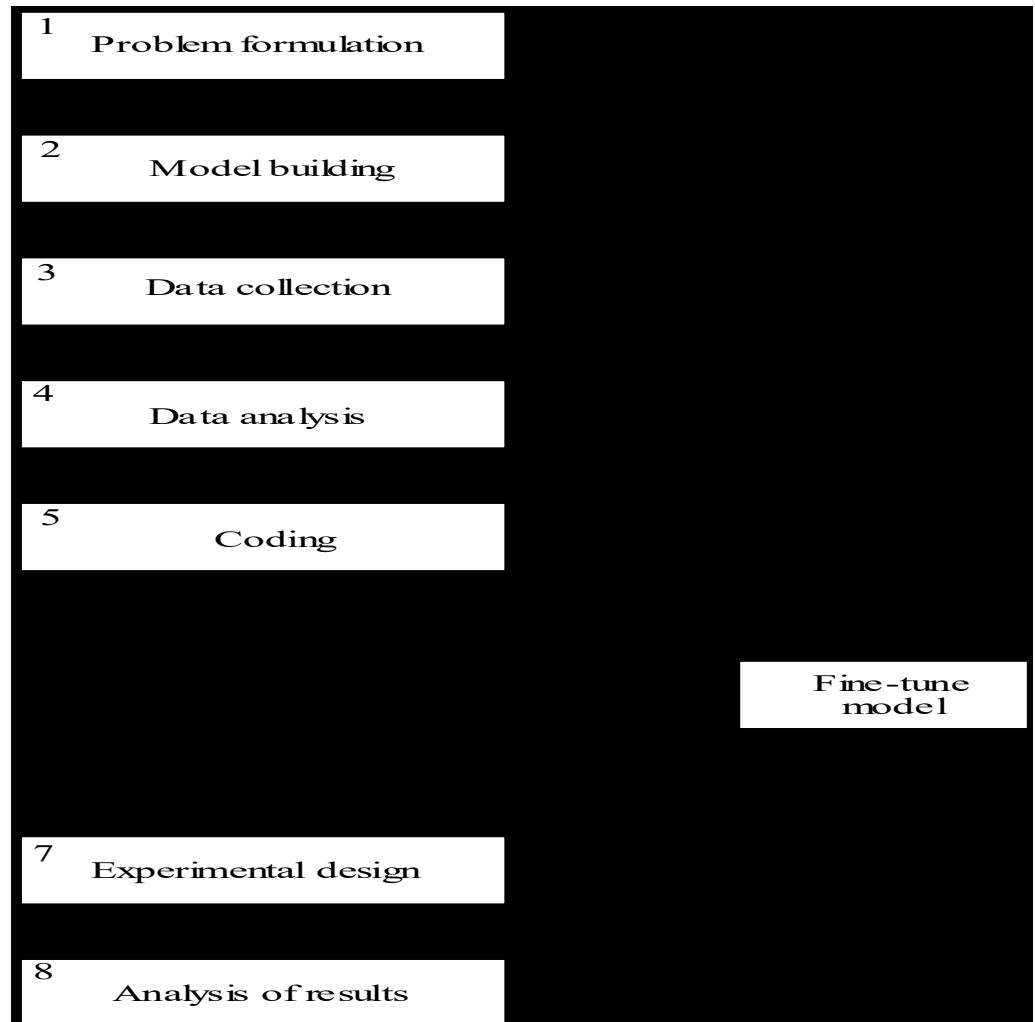
$$p(12) = 10,000(12) - 40,000 = \$80,000 \text{ monthly profit}$$

Example: Ponderosa Development Corp.

Graph of Break-Even Analysis



Steps in OR Study



References

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