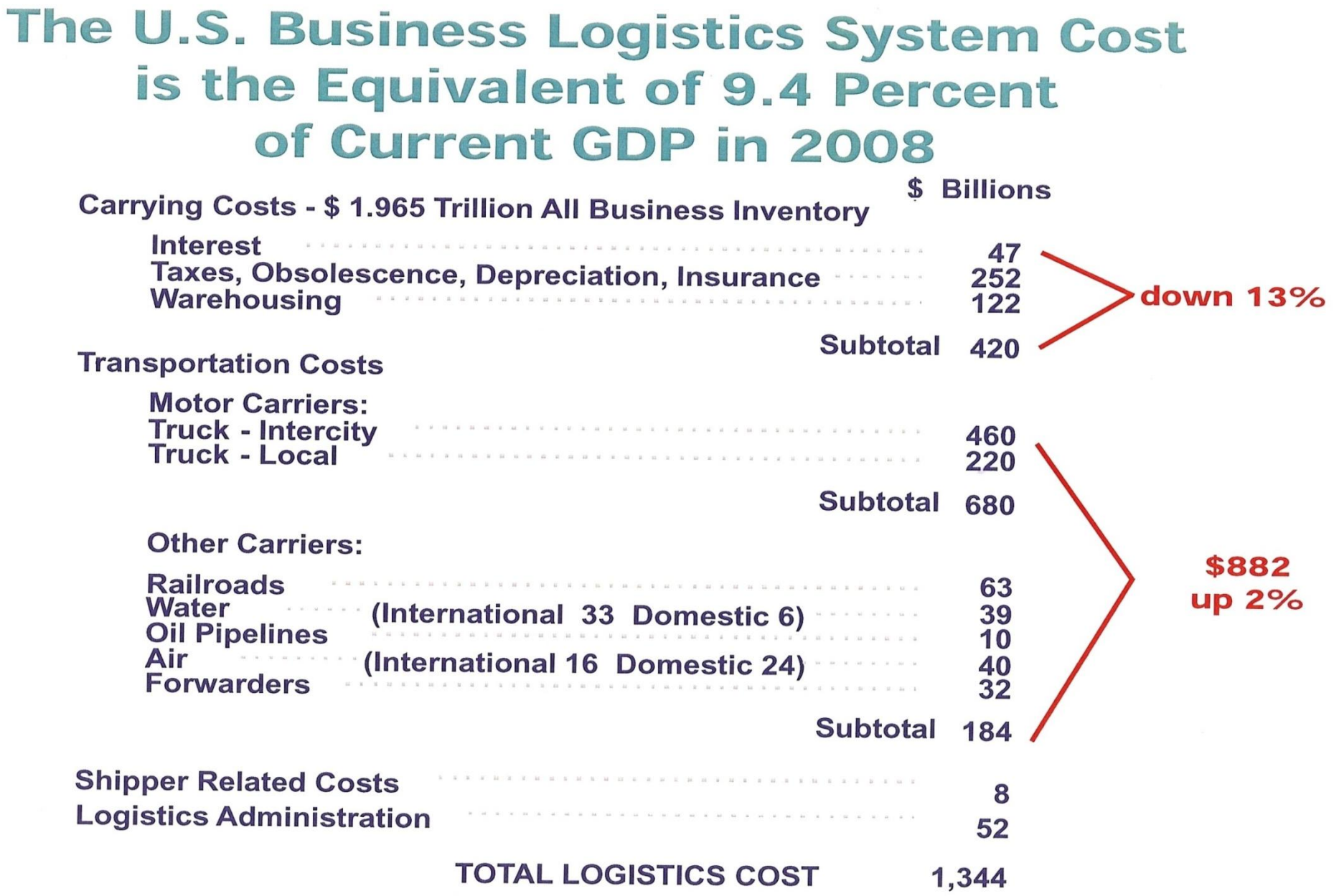
Chapter 9 Managing Inventory in the Supply Chain

- Inventory is an asset on the balance sheet and inventory cost is an expense on the income statement.
- Inventories impacts return on asset (ROA)
- Inventory is important to sales and customer service
- Inventory is also important to sourcing and production

Inventory in US Economy



Rationale for Holding Inventory

- Batching Economies
  - Procurement
  - Production
  - Transportation
- Uncertainty/Safety Stocks
  - All organizations are faced with uncertainty.
  - On the demand side, there is uncertainty in the quantity and timing of customer orders
  - On the supply side, there is uncertainty about getting what is needed from suppliers and order fulfillment time

Rationale for Holding Inventory

- In-Transit and Work-in-Process (WIP) Stocks
  - Time required for transportation means that even while goods are moving, an inventory cost is incurred. The longer the transit time, the higher the inventory cost.
  - WIP stock inventory cost can be significant while they sits in a manufacturing facility.

Rationale for Holding Inventory

- Seasonal Stocks
  - Seasonality can occur in the supply of raw materials, in the demand for finished product, or in both.
  - Those faced with seasonality issues are constantly challenged when determining how much inventory to accumulate.
  - Seasonality can impact transportation.
- Anticipatory Stocks
  - A fifth reason to hold inventory arises when an organization anticipates that an unusual event might occur that will negatively impact its source of supply.

The Importance of Inventory in Other Functional Areas

- Inventory is more prominent in the interface of logistics with other functional areas
  - Finance (both balance sheet & income statement)
  - Marketing (sales growth, customer service, market share)
  - Manufacturing (production runs, seasonality)

Inventory Costs

- Inventory Carrying Costs
  - Cost of capital tied up in inventory
    - lost of opportunity from investing that capital elsewhere
    - hurdle rate
    - weighted average cost of capital (WACC).

Inventory Costs

Storage Space Cost

- includes handling costs associated with moving products into and out of inventory, as well as costs like rent, heat, and light

Inventory Service Cost

- includes insurance and taxes

Inventory Risk Cost

- reflects the possibility that inventory value might decline for reasons beyond firm’s control

Calculating the Cost of Carrying Inventory

- Calculating the cost to carry (or hold) a particular item in inventory involves three steps.
  - Step 1, determine the value of the item stored in inventory.
  - Step 2, determine the cost of each individual carrying cost component to determine the total direct costs consumed by the item while being held in inventory.
  - Step 3, divide the total costs calculated in Step 2 by the value of the item determined in Step 1.

Table 9-5 ABC Power Tools—Inventory Carrying Cost for Item 1

COST CATEGORY	COMPUTATION	ANNUAL COST
1. Direct materials, labor, overhead		$614.65
2. Inbound freight to DC		$ 32.35
3. Labor	$10 per unit received plus $1 per unit per month × 12 months	$ 22.00
4. Space	$0.30/sq. ft./month × 8 sq. ft. × 12 months	$ 28.80
5. Insurance	$2.00 per unit per year	$ 2.00
6. Interest	10% @ $614.65	$ 61.47
7. Taxes	$5 per $100 value @ 20%	$ 6.15
8. Loss and damage	3.9% per year @ $614.65	$ 23.97
9. Obsolescence	1% per year @ $614.65	$ 6.15
10. Total inventory carrying costs		$182.89
11. Inventory carrying cost percent	$182.89/$614.65	29.8%

Trade Off between Order Cost and Inventory Carrying Cost

Table 9-9 Summary of Inventory and Order Cost

ORDER PERIOD	NUMBER OF ORDERS PER YEAR	AVERAGE INVENTORY* (UNITS)	TOTAL ANNUAL ORDER COST**	CHANGE IN TOTAL ORDER COST	TOTAL ANNUAL INVENTORY CARRYING COST†	CHANGE IN TOTAL CARRYING COST	TOTAL COST
1 week	52	50	$10,400		$1,250		$11,650
				–$5,200		$+1,250	
2 weeks	26	100	5,200		2,500		7,700
				–2,600		+2,500	
4 weeks	13	200	2,600		5,000		7,600
				–1,800		+11,250	
13 weeks	4	650	800		16,250		17,050
				–400		+16,250	
26 weeks	2	1,300	400		32,500		32,900
				–200		+32,500	
52 weeks	1	2,600	200		65,000		65,200

*Assume sales or usage at 100 units per week. Average Inventory = (Beginning Inventory – Ending Inventory) ÷ 2

**Cost per order is $200.

†Value is $100 and carrying cost is 25%.

Order Cost is the expense of placing an order for additional inventory

In-Transit Inventory Carrying Cost

- Owner of product while it is in transit will incur inventory carrying costs.
- In-transit inventory carrying cost becomes especially important for global supply chains since distance and time from the shipping location both increase.

Determining the Cost of In-Transit Inventories

- storage space cost not relevant to inventory in transit
- insurance needs requires special analysis
- inventory in transit may incur obsolescence or deterioration costs

The Just-in-Time Approach

- Four major elements
  - zero inventories
  - short, consistent lead times
  - small, frequent replenishment quantities
  - high quality, zero defects

Vendor-Managed Inventory

- Basic principles:
  - The vendor and its customer agree on which products are to be managed.
  - An agreement is made on reorder points and economic order quantities for each of these products.
  - As these products are shipped, the customer notifies the vendor by SKU, of the volumes shipped on a real-time basis.
  - The vendor is responsible to ensure timely replenishment and no stock out.

ABC Analysis: Focusing management attention on the important few

- Application of Pareto's Law, or the "80–20 Rule"
  - Many business situations were dominated by a relatively few vital elements
- Assigns inventory items to one of three groups according to the relative impact or value of the items
  - A items are considered to be the most important
  - B items being of lesser importance
  - C items being the least important

Relationship between Items in Product line and Sales contribution

Figure 9-20 ABC Inventory Analysis