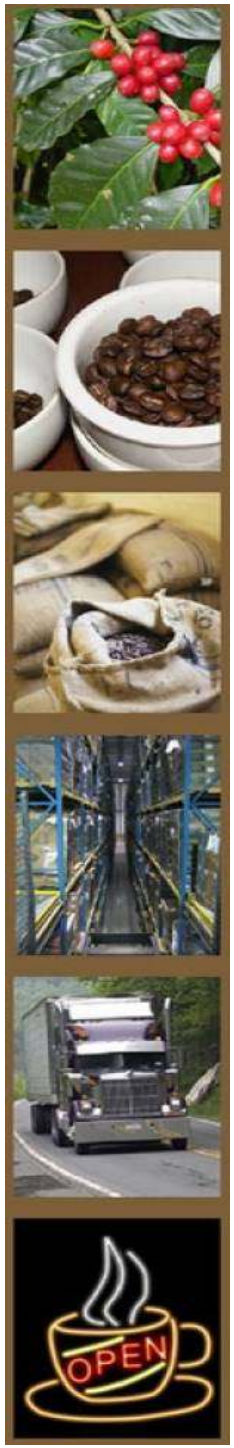
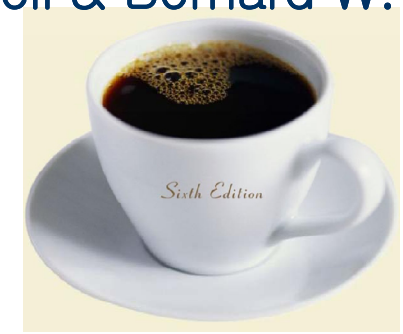


Chapter 10

Supply Chain Management Strategy and Design

Operations Management - 6th Edition

Roberta Russell & Bernard W. Taylor, III



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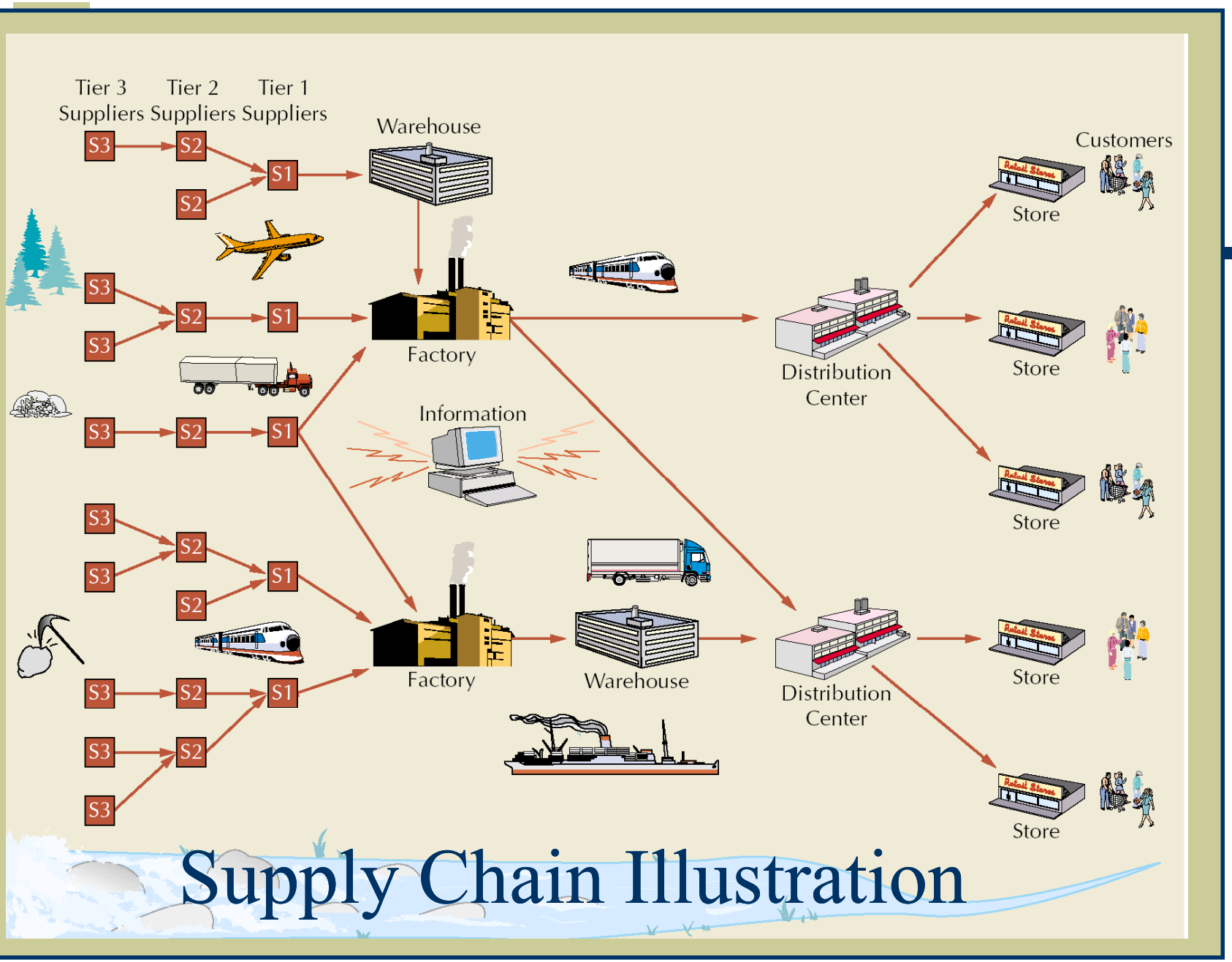
Lecture Outline

- The Management of Supply Chains
- Information Technology: A Supply Chain Enabler
- Supply Chain Integration
- Supply Chain Management (SCM) Software
- Measuring Supply Chain Performance

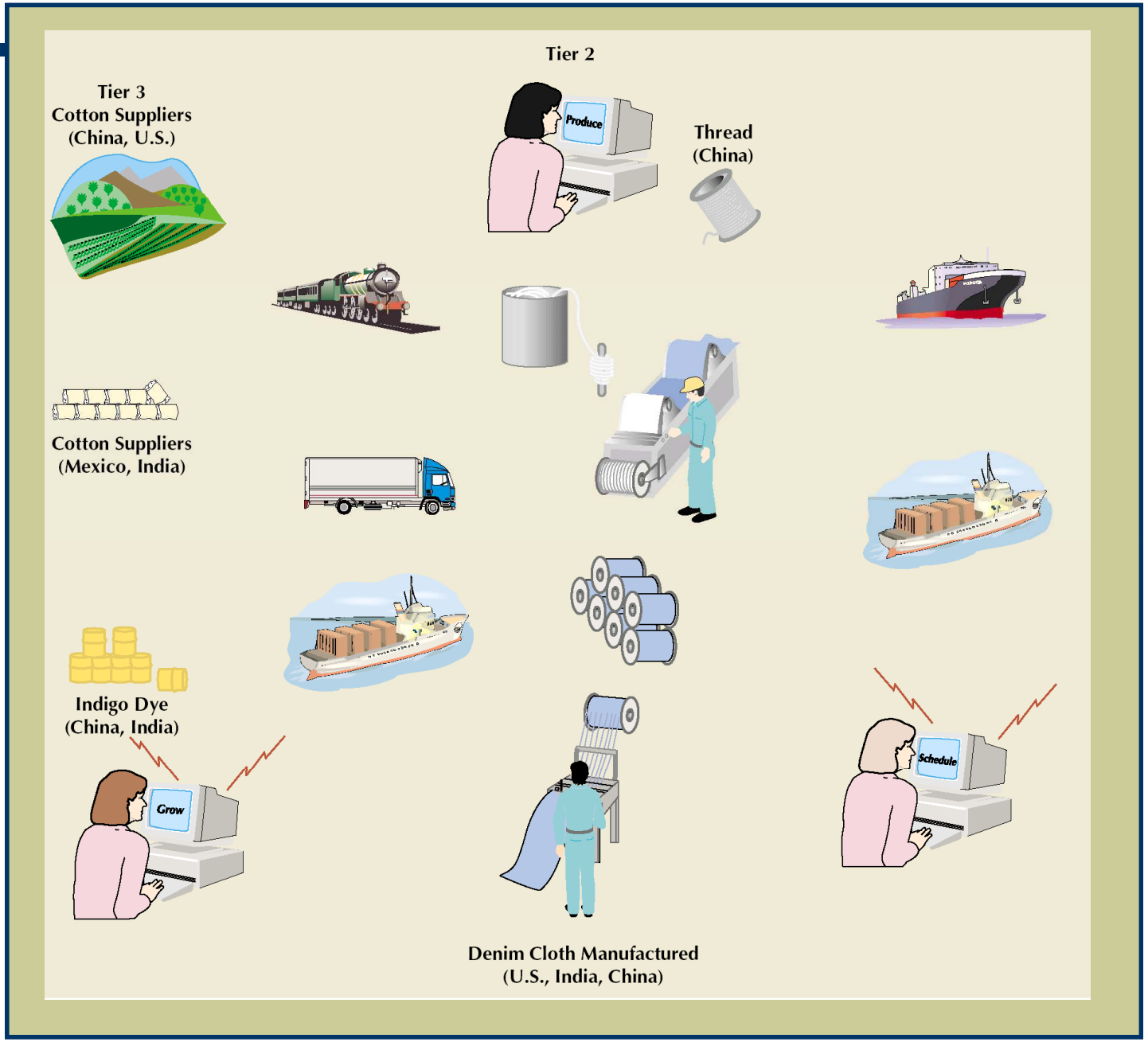
Supply Chains

- All facilities, functions, and activities associated with flow and transformation of goods and services from raw materials to customer, as well as the associated information flows
- An integrated group of processes to "source," "make," and "deliver" products

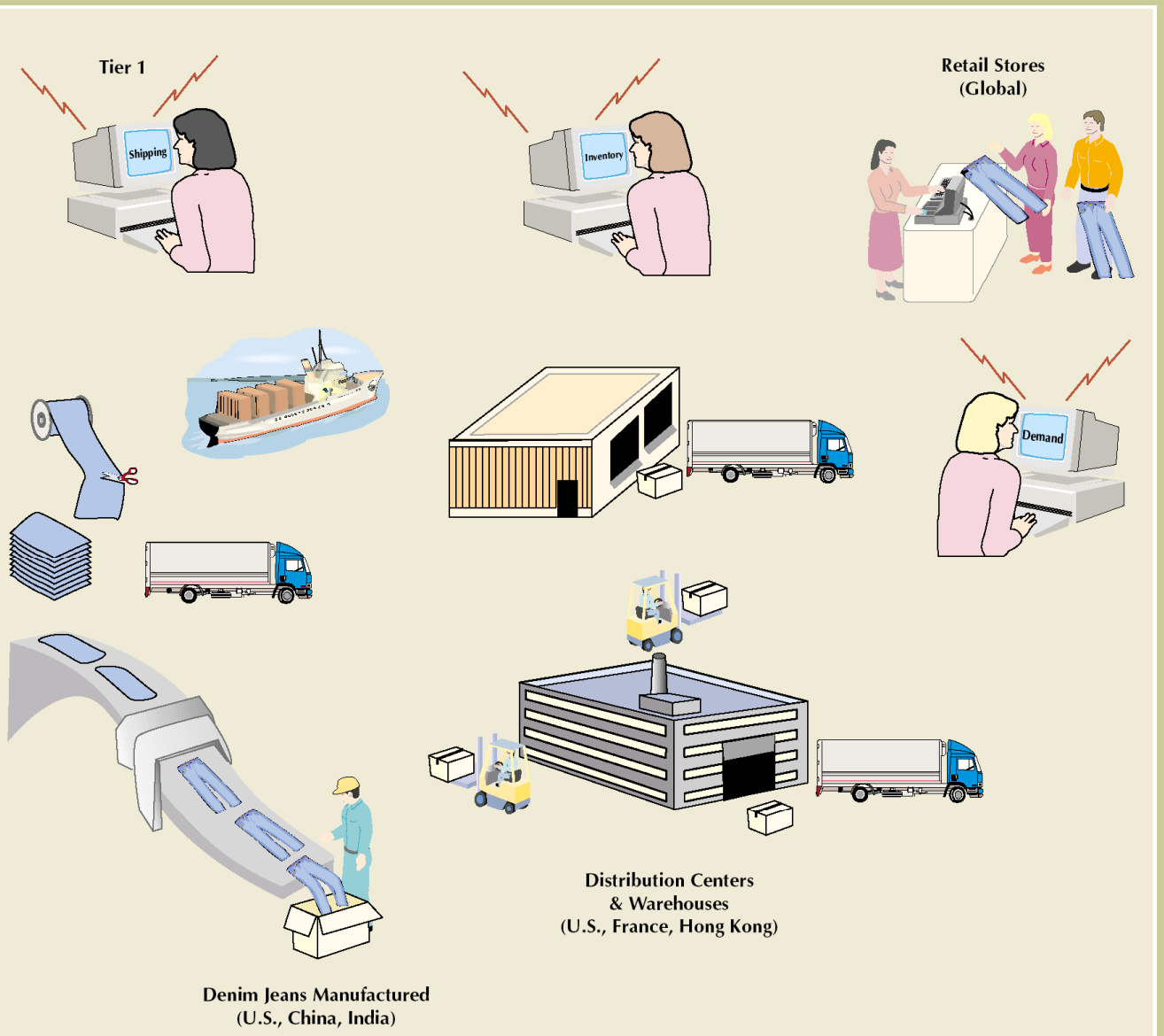


Supply Chain Illustration

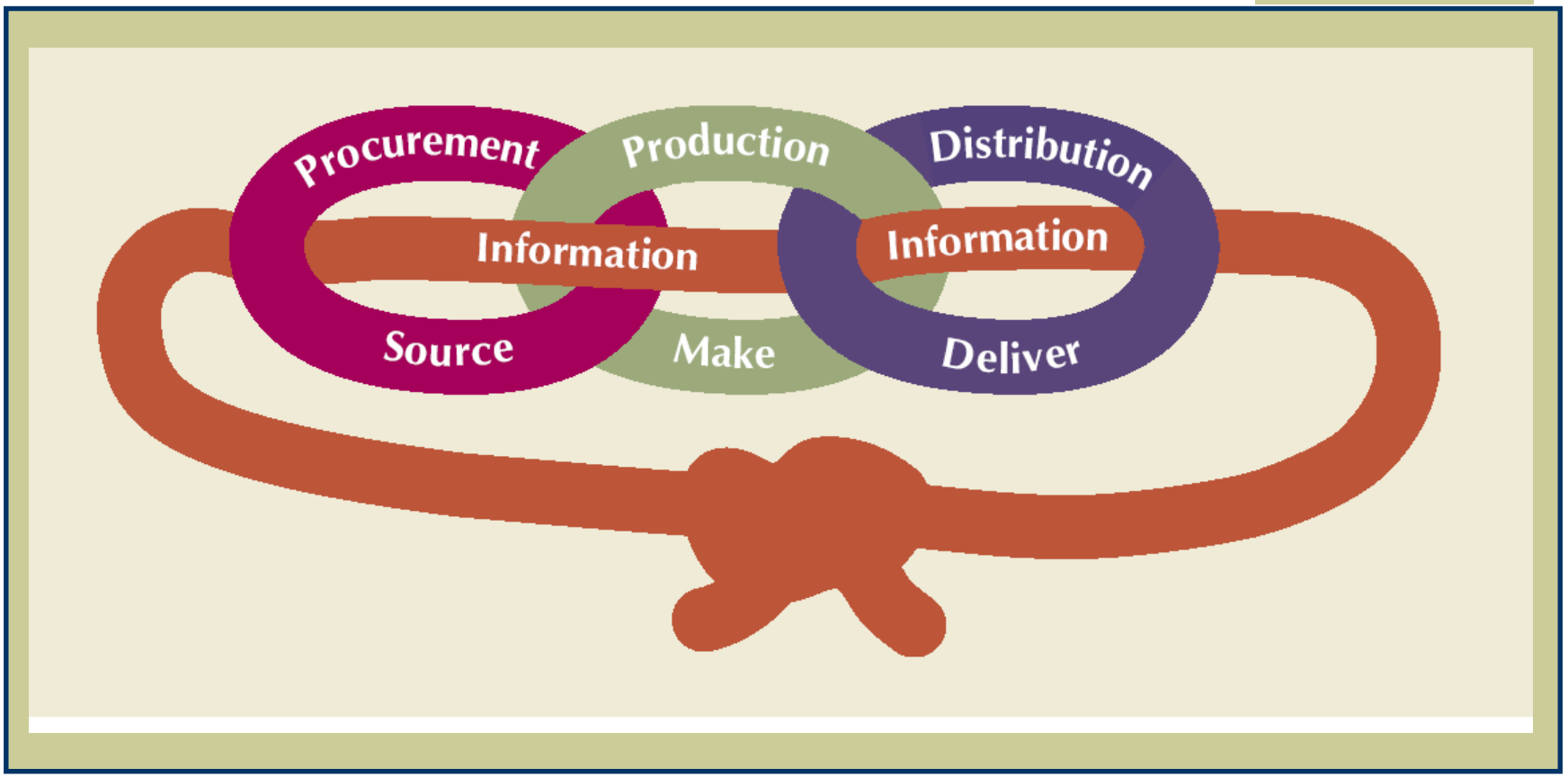
Supply Chain for Denim Jeans



Supply Chain for Denim Jeans (cont.)



Supply Chain Processes



Supply Chain for Service Providers

- More difficult than manufacturing
- Does not focus on the flow of physical goods
- Focuses on human resources and support services
- More compact and less extended

Value Chains

- Value chain
  - every step from raw materials to the eventual end user
  - ultimate goal is delivery of maximum value to the end user
- Supply chain
  - activities that get raw materials and subassemblies into manufacturing operation
  - ultimate goal is same as that of value chain
- Demand chain
  - increase value for any part or all of chain
- Terms are used interchangeably
- Value
  - creation of value for customer is important aspect of supply chain management

Supply Chain Management (SCM)

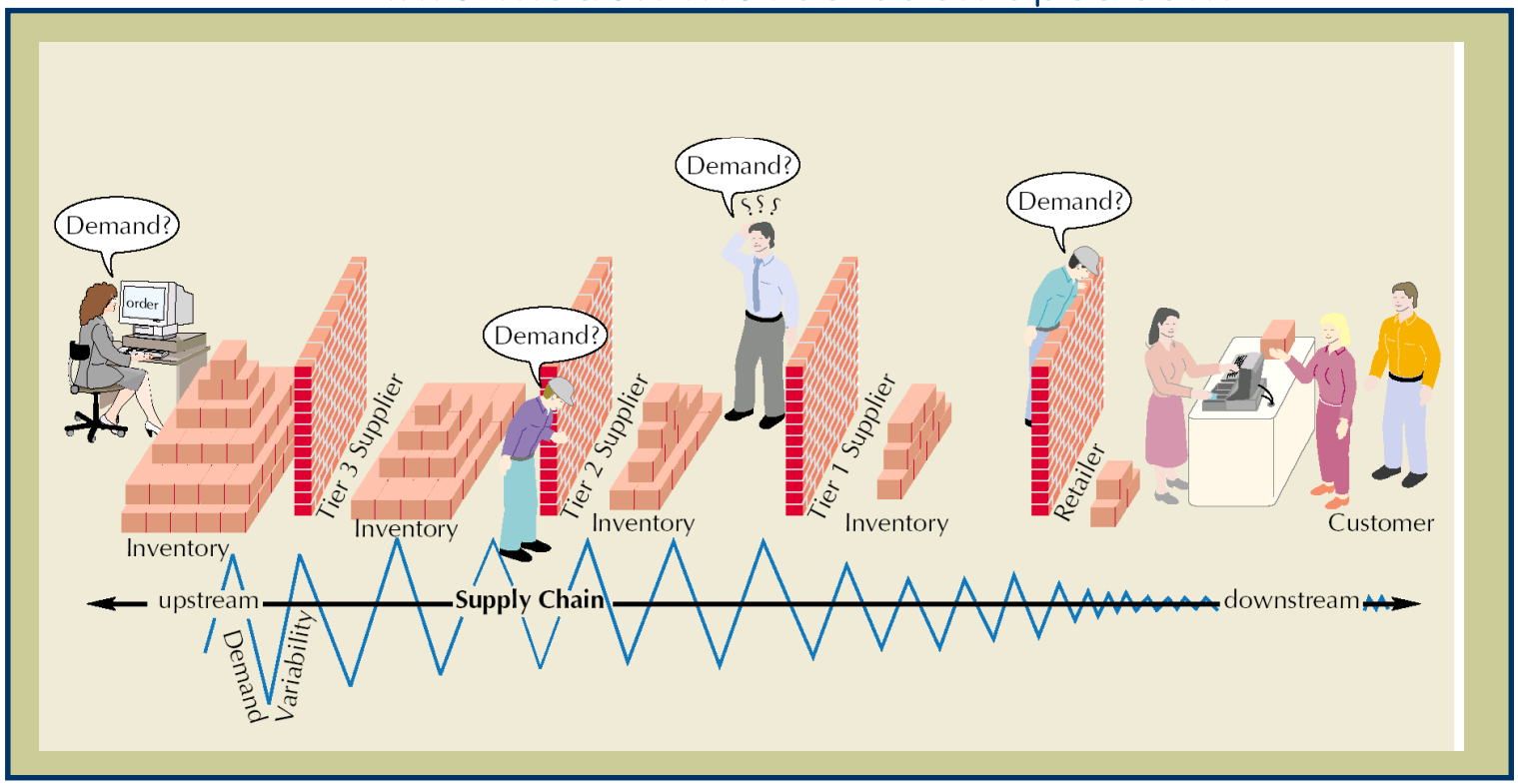
- Managing flow of information through supply chain in order to attain the level of synchronization that will make it more responsive to customer needs while lowering costs
- Keys to effective SCM
  - information
  - communication
  - cooperation
  - trust

Supply Chain Uncertainty and Inventory

- One goal in SCM:
  - respond to uncertainty in customer demand without creating costly excess inventory
- Negative effects of uncertainty
  - lateness
  - incomplete orders
- Inventory
  - insurance against supply chain uncertainty
- Factors that contribute to uncertainty
  - inaccurate demand forecasting
  - long variable lead times
  - late deliveries
  - incomplete shipments
  - product changes
  - batch ordering
  - price fluctuations and discounts
  - inflated orders

Bullwhip Effect

Occurs when slight demand variability is magnified as information moves back upstream



Risk Pooling

- Risks are aggregated to reduce the impact of individual risks
  - Combine inventories from multiple locations into one
  - Reduce parts and product variability, thereby reducing the number of product components
  - Create flexible capacity

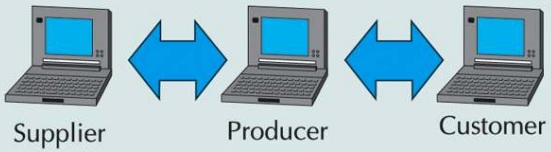
Information Technology: A Supply Chain Enabler

- Information links all aspects of supply chain
- E-business
  - replacement of physical business processes with electronic ones
- Electronic data interchange (EDI)
  - a computer-to-computer exchange of business documents
- Bar code and point-of-sale
  - data creates an instantaneous computer record of a sale

Information Technology: A Supply Chain Enabler (cont.)

- Radio frequency identification (RFID)
  - technology can send product data from an item to a reader via radio waves
- Internet
  - allows companies to communicate with suppliers, customers, shippers and other businesses around the world instantaneously
- Build-to-order (BTO)
  - direct-sell-to-customers model via the Internet; extensive communication with suppliers and customer

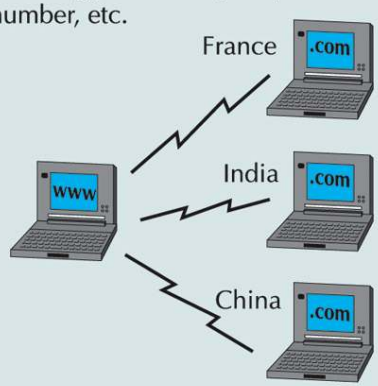
Supply Chain Enablers



EDI—links supply chair members for order processing, accounting, production, inventory control and distribution

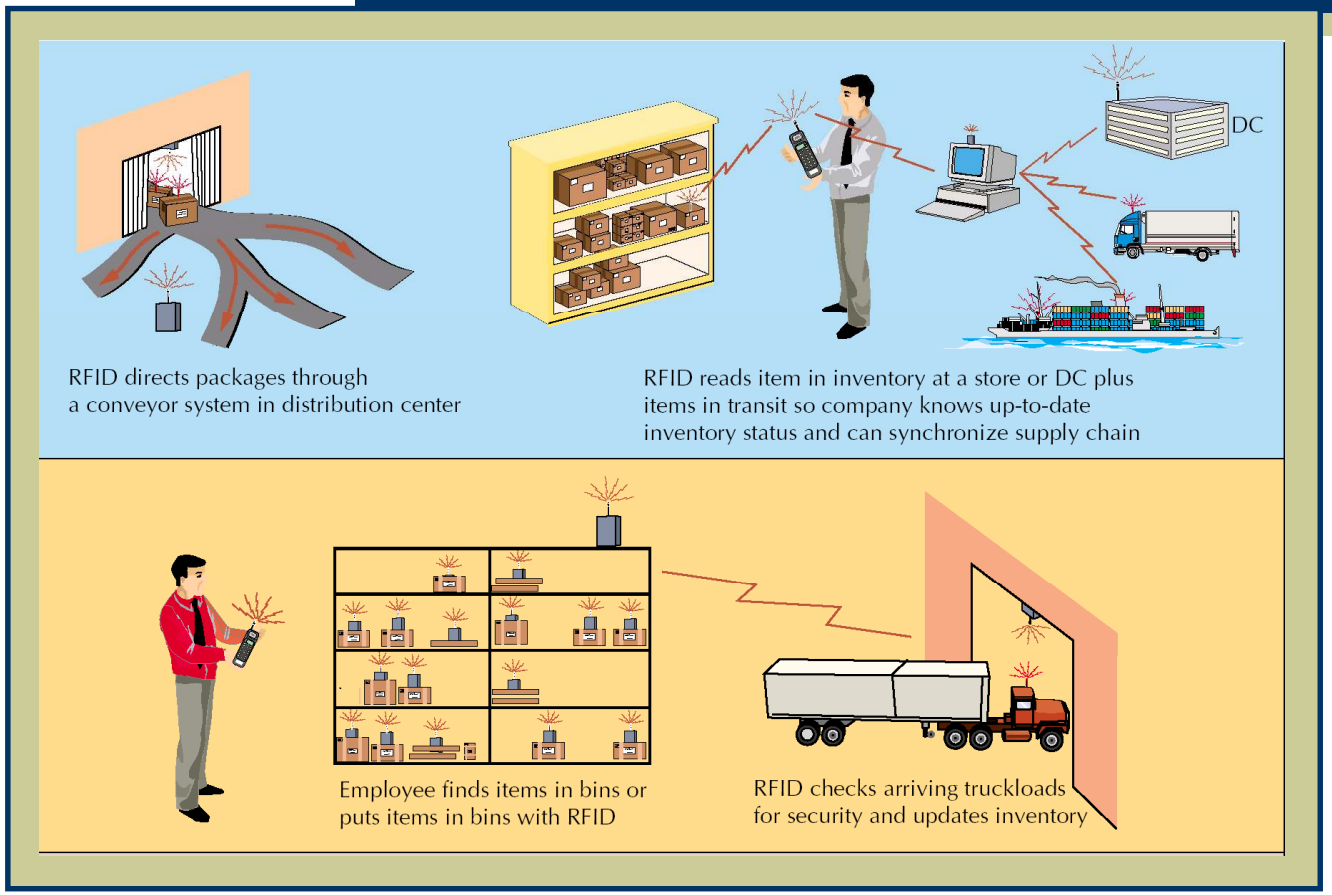
Radio Frequency Identification (RFID)–uses radio waves to transfer data between a scanner and an item such as a package or shipping container

Bar codes—contains identyifing information about products as they flow through the supply chain including product description, item number, source and destination, handling procedures, cost, order number, etc.

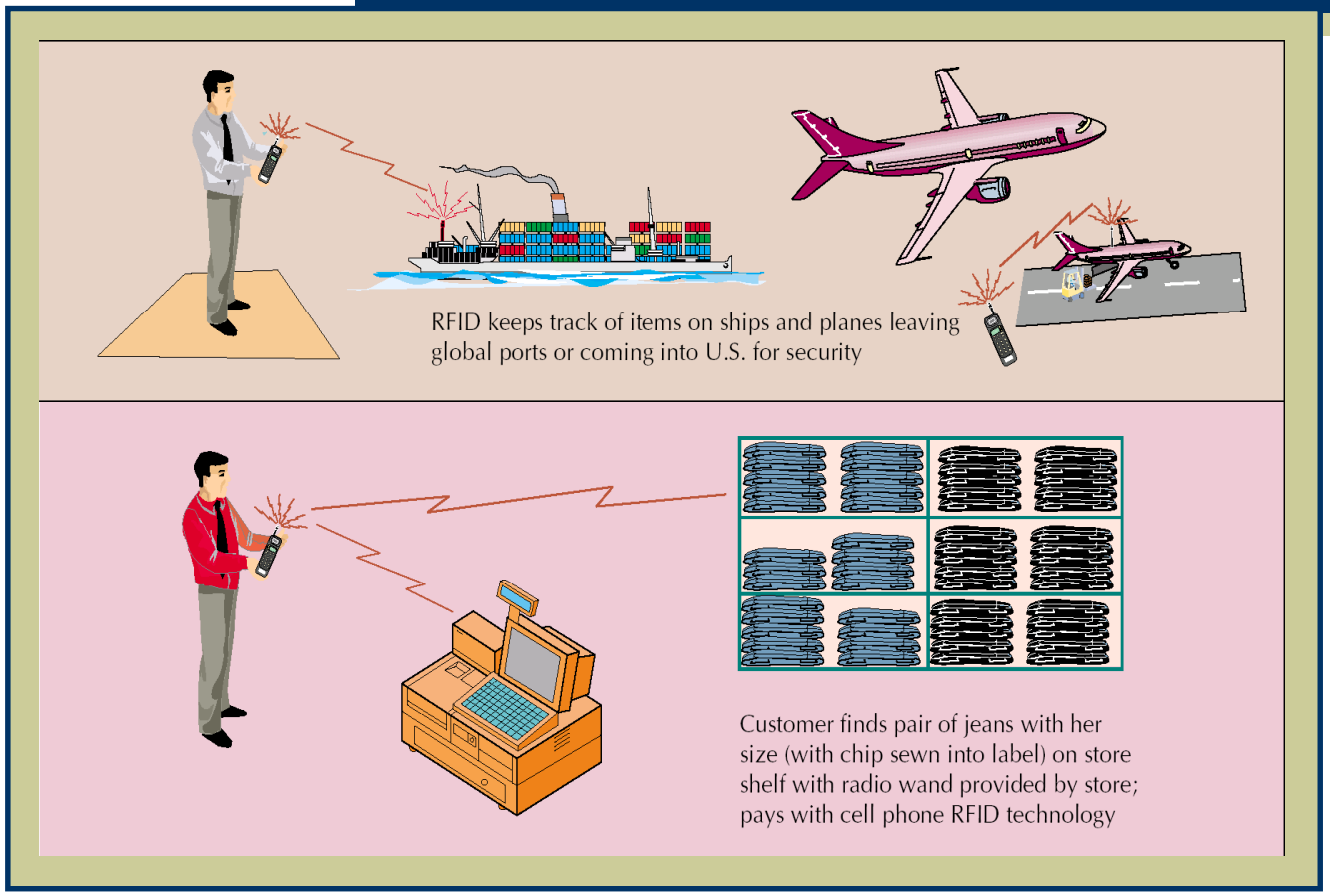


Internet—allows companies to communicate with suppliers, customers, shippers and other busineses around the world, instantaneously

RFID Capabilities



RFID Capabilities (cont.)



Supply Chain Integration

- Information sharing among supply chain members
  - Reduced bullwhip effect
  - Early problem detection
  - Faster response
  - Builds trust and confidence
- Collaborative planning, forecasting, replenishment, and design
  - Reduced bullwhip effect
  - Lower costs (material, logistics, operating, etc.)
  - Higher capacity utilization
  - Improved customer service levels

Supply Chain Integration (cont.)

- Coordinated workflow, production and operations, procurement
  - Production efficiencies
  - Fast response
  - Improved service
  - Quicker to market
- Adopt new business models and technologies
  - Penetration of new markets
  - Creation of new products
  - Improved efficiency
  - Mass customization

Collaborative Planning, Forecasting, and Replenishment (CPFR)

- Process for two or more companies in a supply chain to synchronize their demand forecasts into a single plan to meet customer demand
- Parties electronically exchange
  - past sales trends
  - point-of-sale data
  - on-hand inventory
  - scheduled promotions
  - forecasts

Supply Chain Management (SCM) Software

- Enterprise resource planning (ERP)
  - software that integrates the components of a company by sharing and organizing information and data

Key Performance Indicators

- Metrics used to measure supply chain performance
  - Inventory turnover

$$\text{Inventory turns} = \frac{\text{Cost of goods sold}}{\text{Average aggregate value of inventory}}$$

  - Total value (at cost) of inventory

$$\text{Average aggregate value of inventory} = \sum (\text{average inventory for item } i) \times (\text{unit value item } i)$$

  - Days of supply

$$\text{Days of supply} = \frac{\text{Average aggregate value of inventory}}{(\text{Cost of goods sold})/(365 \text{ days})}$$

  - Fill rate: fraction of orders filled by a distribution center within a specific time period

Computing Key Performance Indicators

The Tomahawk Motorcycle Company manufactures motorcycles. Last year the cost of goods sold was $425 million. The company had the following average value of production materials and parts, work-in-process, and finished goods inventory:

Production materials and parts	$ 4,629,000
Work-in-process	17,465,000
Finished goods	12,322,000
Total average aggregate value of inventory	$34,416,000

The company wants to know the number of inventory turns and days of supply being held in inventory.

Solution

$$\text{Inventory turns} = \frac{\text{Cost of goods sold}}{\text{Average aggregate value of inventory}}$$

$$= \frac{\$425{,}000{,}000}{34{,}416{,}000}$$

$$\text{Inventory turns} = 12.3$$

$$\text{Days of supply} = \frac{\text{Average aggregate value of inventory}}{(\text{Cost of goods sold})/(365 \text{ days})}$$

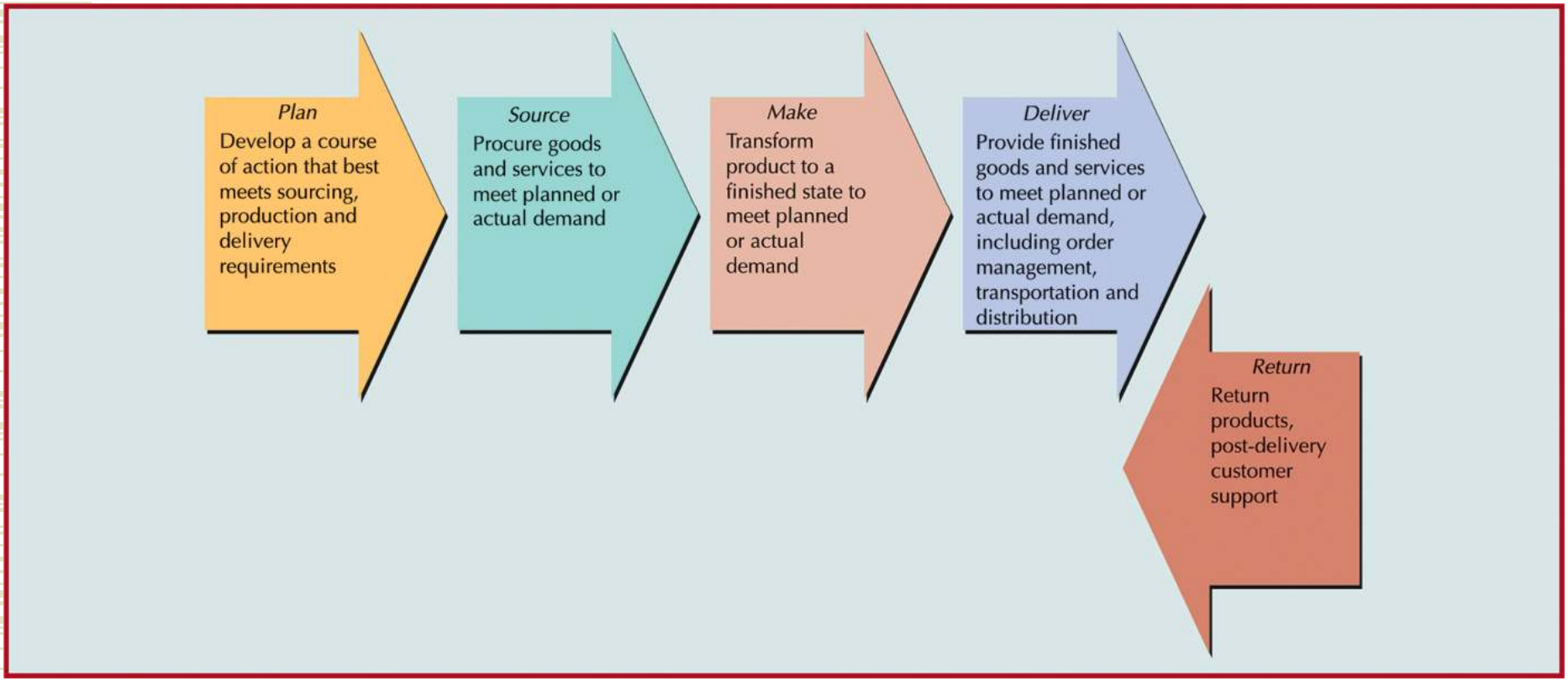
$$= \frac{\$34{,}416{,}000}{(425{,}000{,}000)/(365)}$$

$$\text{Days of supply} = 29.6$$

Process Control and SCOR

- Process Control
  - not only for manufacturing operations
  - can be used in any processes of supply chain
- Supply Chain Operations Reference (SCOR)
  - a cross industry supply chain diagnostic tool maintained by the Supply Chain Council

SCOR



SCOR (cont.)

	Performance Attribute	Performance Metric	Definition
Customer Facing	Supply chain delivery reliability	Delivery performance	Percentage of orders delivered on time and in full to the customer
		Fill rate	Percentage of orders shipped within 24 hours of order receipt
		Perfect order fulfillment	Percentage of orders delivered on time and in full, perfectly matched with order with no errors
	Supply chain responsiveness	Order fulfillment lead time	Number of days from order receipt to customer delivery
	Supply chain flexibility	Supply chain response time	Number of days for the supply chain to respond to an unplanned significant change in demand without a cost penalty
		Production flexibility	Number of days to achieve an unplanned 20% change in orders without a cost penalty
Internal Facing	Supply chain cost	Supply chain management cost	The direct and indirect cost to plan, source and deliver products and services
		Cost of goods sold	The direct cost of material and labor to produce a product or service
		Value-added productivity	Direct material cost subtracted from revenue and divided by the number of employees, similar to sales per employee
		Warranty/returns processing cost	Direct and indirect costs associated with returns including defective, planned maintenance and excess inventory
	Supply Chain Asset Management Efficiency	Cash-to-cash cycle time	The number of days that cash is tied up as working capital
		Inventory days of supply	The number of days that cash is tied up as inventory
		Asset turns	Revenue divided by total assets including working capital and fixed assets