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8

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PowerPoint presentation to accompany
Heizer and Render
Operations Management, Eleventh Edition
Principles of Operations Management, Ninth Edition

PowerPoint slides by Jeff Heyl

Darden's Supply Chain

- Largest publicly traded casual dining company in the world
- Serves over 400 million meals annually in more than 1,900 restaurants in the US and Canada
- Annual sales of flagship brands totals $6 billion
- Operations is the strategy

Darden's Supply Chain

- Sources food from five continents and thousands of suppliers
- Four distinct supply chains
- Over $2 billion spent annually in supply chains
- Competitive advantage achieved through superior supply chain

SUPPLY-CHAIN MANAGEMENT

The objective of supply chain management is to coordinate activities within the supply chain to maximize the supply chain's competitive advantage and benefits to the ultimate consumer

The Supply Chain's Strategic Importance

- The coordination of all supply chain activities, starting with **raw materials** and ending with a **satisfied customer**
- Includes suppliers, manufacturers and/or service providers, distributors, wholesalers, retailers, and final customer

The Supply Chain's Strategic Importance

- Large portion of sales dollars spent on purchases
- Supplier relationships increasingly integrated and long term
  - Improve innovation, speed design, reduce costs
- Managing supplier relationships has added emphasis

Supply Chain Costs

TABLE

Supply Chain Costs as a Percentage of Sales

INDUSTRY	% PURCHASED
Automobiles	67
Beverages	52
Chemical	62
Food	60
Lumber	61
Metals	65
Paper	55
Petroleum	79
Restaurants	35
Transportation	62

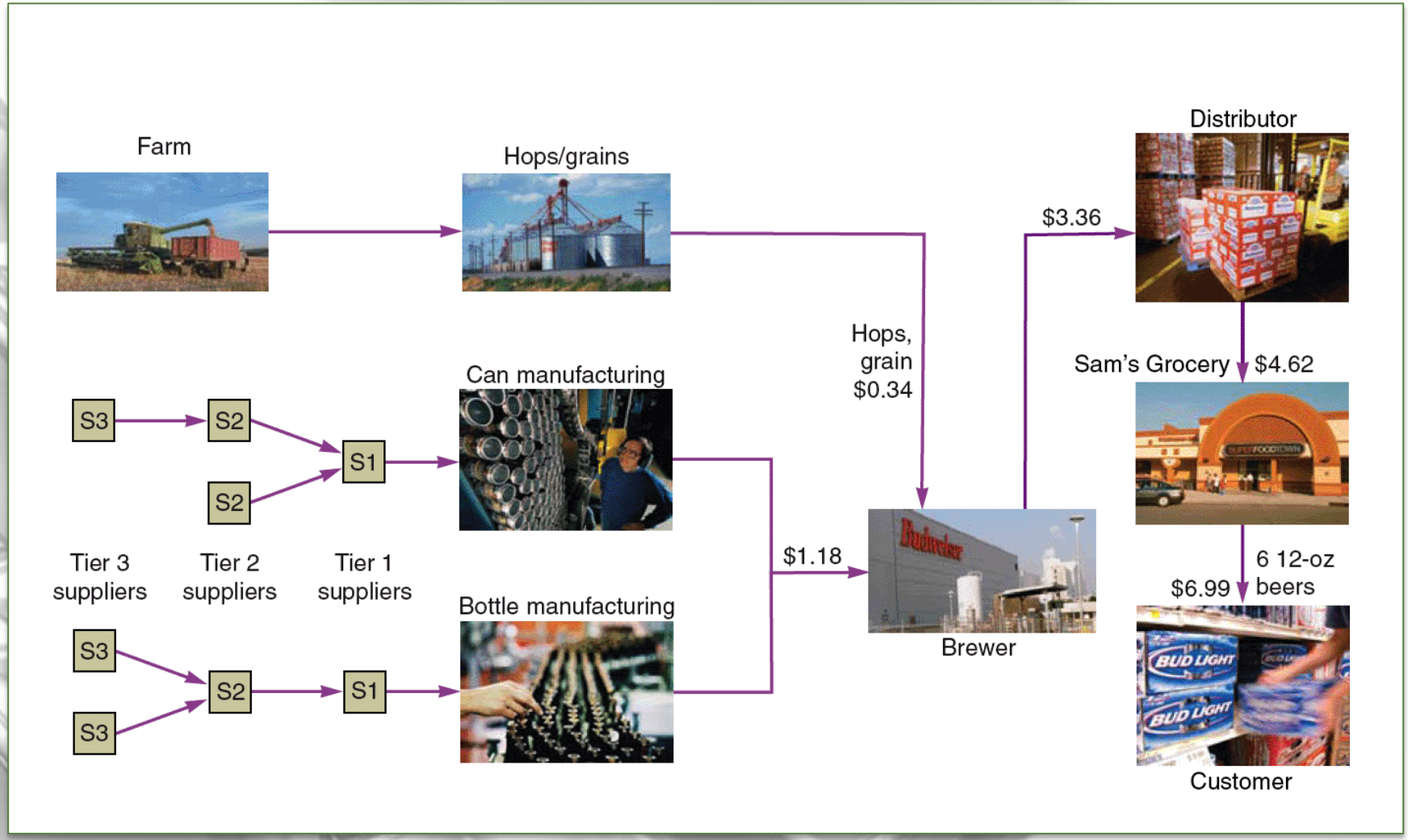
Supply Chain vs Sales Strategy

Hau Lee Furniture

60% of sales $ in supply chain
Current gross profit = $10,000
Increase profits to $15,000 (50%)

	CURRENT SITUATION	SUPPLY CHAIN STRATEGY	SALES STRATEGY
Sales	$100,000	**$100,000**	$125,000
Cost of materials	$60,000 (60%)	**$55,000 (55%)**	$75,000 (60%)
Production costs	$20,000 (20%)	**$20,000 (20%)**	$25,000 (20%)
Fixed costs	$10,000 (10%)	**$10,000 (10%)**	$10,000 (8%)
Profit	$10,000 (10%)	**$15,000 (15%)**	$15,000 (12%)

A Supply Chain for Beer



Supply Chain Management

TABLE **How Corporate Strategy Impacts Supply Chain Decisions**

	LOW COST STRATEGY	RESPONSE STRATEGY	DIFFERENTIATION STRATEGY
Primary supplier selection criteria	• Cost	• Capacity • Speed • Flexibility	• Product development skills • Willing to share information • Jointly and rapidly develop products
Supply chain inventory	• Minimize inventory to hold down costs	• Use buffer stocks to ensure speedy supply	• Minimize inventory to avoid product obsolescence
Distribution network	• Inexpensive transportation • Sell through discount distributors/retailers	• Fast transportation • Provide premium customer service	• Gather and communicate market research data • Knowledgeable sales staff
Product design characteristics	• Maximize performance • Minimize cost	• Low setup time • Rapid production ramp-up	• Modular design to aid product differentiation

Sourcing Issues

- Make-or-buy vs. outsourcing
  - Choosing between obtaining products and services externally as opposed to producing them internally
- Outsourcing
  - Transfer traditional internal activities and resources to outside vendors
  - Efficiency in specialization
  - Focus on core competencies

Six Sourcing Strategies

- Many suppliers
- Few suppliers
- Vertical integration
- Joint ventures
- *Keiretsu* networks
- Virtual companies

Many Suppliers

- Commonly used for commodity products
- Purchasing is typically based on price
- Suppliers compete with one another
- Supplier is responsible for technology, expertise, forecasting, cost, quality, and delivery

Few Suppliers

- Buyer forms longer term relationships with fewer suppliers
- Create value through economies of scale and learning curve improvements
- Suppliers more willing to participate in JIT programs and contribute design and technological expertise
- Cost of changing suppliers is huge
- Trade secrets and other alliances

Vertical Integration

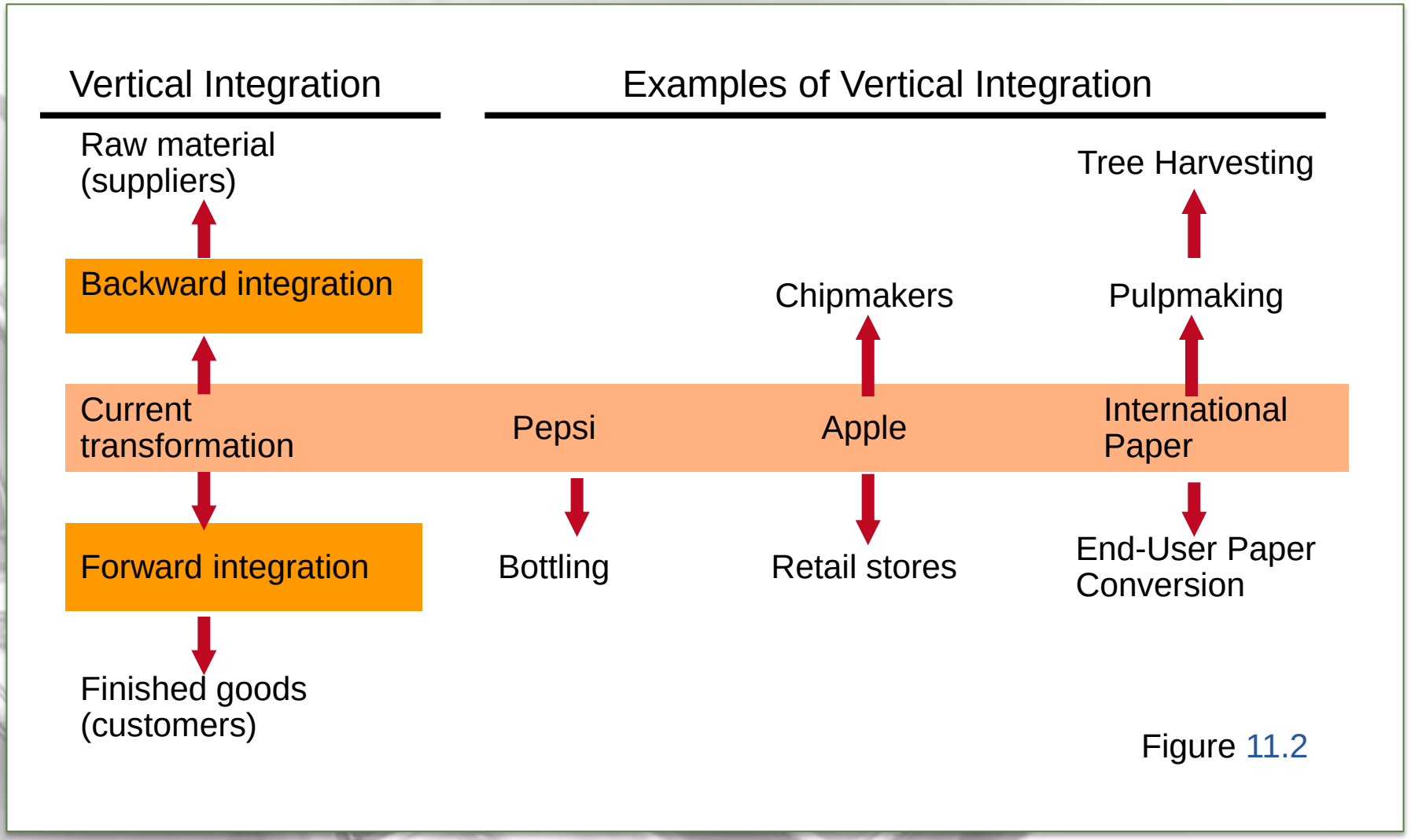


Figure 11.2

Vertical Integration

- Developing the ability to produce goods or service previously purchased
- Integration may be forward, towards the customer, or backward, towards suppliers
- Can improve cost, quality, and inventory but requires capital, managerial skills, and demand
- Risky in industries with rapid technological change

Joint Ventures

- Formal collaboration
  - Enhance skills
  - Secure supply
  - Reduce costs
- Cooperation without diluting brand or conceding competitive advantage

Keiretsu Networks

- A middle ground between few suppliers and vertical integration
- Supplier becomes part of the company coalition
- Often provide financial support for suppliers through ownership or loans
- Members expect long-term relationships and provide technical expertise and stable deliveries
- May extend through several levels of the supply chain

Virtual Companies

- Rely on a variety of supplier relationships to provide services on demand
- Fluid organizational boundaries that allow the creation of unique enterprises to meet changing market demands
- Relationships may be short- or long-term
- Exceptionally lean performance, low capital investment, flexibility, and speed

Supply Chain Risk

- More reliance on supply chains means more risk
- Fewer suppliers increase dependence
- Compounded by globalization and logistical complexity
- Vendor reliability and quality risks
- Political and currency risks

Risk and Mitigation Tactics

- Research and assess possible risks
- Innovative planning
- Reduce potential disruptions
- Prepare responses for negative events
- Flexible, secure supply chains
- Diversified supplier base

Risk and Mitigation Tactics

TABLE **Supply Chain Risks and Tactics**

RISK	RISK REDUCTION TACTICS	EXAMPLE
Supplier failure to deliver	Use multiple suppliers; effective contracts with penalties; subcontractors on retainer; pre-planning	**McDonald's** planned its supply chain 6 years before its opening in Russia. Every plant—bakery, meat, chicken, fish, and lettuce—is closely monitored to ensure strong links.
Supplier quality failure	Careful supplier selection, training, certification, and monitoring	**Darden Restaurants** has placed extensive controls, including third-party audits, on supplier processes and logistics to ensure constant monitoring and reduction of risk.

Risk and Mitigation Tactics

TABLE	Supply Chain Risks and Tactics	
RISK	**RISK REDUCTION TACTICS**	**EXAMPLE**
Logistics delays or damage	Multiple/redundant transportation modes and warehouses; secure packaging; effective contracts with penalties	**Walmart**, with its own trucking fleet and numerous distribution centers located throughout the U.S., finds alternative origins and delivery routes bypassing problem areas.
Distribution	Careful selection, monitoring, and effective contracts with penalties	**Toyota** trains its dealers around the world, invoking principles of the Toyota Production System to help dealers improve customer service, used-car logistics, and body and paint operations.

Risk and Mitigation Tactics

TABLE	Supply Chain Risks and Tactics	
RISK	**RISK REDUCTION TACTICS**	**EXAMPLE**
Information loss or distortion	Redundant databases; secure IT systems; training of supply chain partners on the proper interpretations and uses of information	**Boeing** utilizes a state-of-the-art international communication system that transmits engineering, scheduling, and logistics data to Boeing facilities and suppliers worldwide.
Political	Political risk insurance; cross-country diversification; franchising and licensing	**Hard Rock Café** reduces political risk by franchising and licensing, rather than owning, when the political and cultural barriers seem significant.

Risk and Mitigation Tactics

TABLE	Supply Chain Risks and Tactics	
RISK	**RISK REDUCTION TACTICS**	**EXAMPLE**
Economic	Hedging to combat exchange rate risk; purchasing contracts that address price fluctuations	**Honda and Nissan** are moving more manufacturing out of Japan as the exchange rate for the yen makes Japanese-made autos more expensive.
Natural catastrophes	Insurance; alternate sourcing; cross-country diversification	**Toyota**, after its experience with fires, earthquakes, and tsunamis, now attempts to have at least two suppliers, each in a different geographical region, for each component.

Risk and Mitigation Tactics

TABLE **Supply Chain Risks and Tactics**

RISK	RISK REDUCTION TACTICS	EXAMPLE
Theft, vandalism, and terrorism	Insurance; patent protection; security measures including RFID and GPS; diversification	**Domestic Port Radiation Initiative**: The U.S. government has set up radiation portal monitors that scan nearly all imported containers for radiation.

Security and JIT

- Shipments get misrouted, stolen, damaged, or excessively delayed
- Technological innovations are improving security and inventory management
  - Location, motion sensors, broken seals, temperature
- Tracking can help expedite shipments

Managing the Integrated Supply Chain

Bullwhip effect occurs when orders are relayed through the supply chain increasing at each step

- Issues
  - **Local optimization** can magnify fluctuations
  - **Incentives** push merchandise into the supply chain for sales that have not occurred
  - **Large lots** reduce shipping costs but increase inventory holding and do not reflect actual sales

Managing the Integrated Supply Chain

- Opportunities
  - **Accurate "pull" data**, shared information
  - **Lot size reduction**, shipping, discounts, reduced ordering costs
  - **Single stage control of replenishment**
    - Single supply chain member responsible for ordering
  - **Vendor managed inventory (VMI)**

Managing the Integrated Supply Chain

- Opportunities
  - **Collaborative planning, forecasting, and replenishment (CPFR)** through the supply chain
  - **Blanket orders** against which actual orders are released
  - **Standardization**

Managing the Integrated Supply Chain

- Opportunities
  - **Postponement** withholds modification as long as possible
  - **Electronic ordering and funds transfer** speed transactions and reduce paperwork
  - **Drop shipping and special packaging** bypasses the seller and reduces costs

Building the Supply Base

- Supplier evaluation
  - Finding potential suppliers
  - Determine likelihood of their becoming good suppliers
  - **Supplier certification**
    - Qualification
    - Education
    - Certification

Building the Supply Base

- Supplier development
  - Integrate the supplier into the system
    - Quality requirements
    - Product specifications
    - Schedules and delivery
    - Procurement policies
    - Training
    - Engineering and production help
    - Information transfer procedures

Building the Supply Base

- Negotiation
  - A significant element in purchasing
  - Highly valued skills
    - **Cost-based price model**
      - Supplier opens books
    - **Market-based price model**
      - Based on published, auction, or indexed prices
    - **Competitive bidding**
      - Common policy for many purchases
      - Does not generally foster long-term relationships

Building the Supply Base

- Contracting
  - Share risks, benefits, create incentives
- Centralized purchasing
  - Leverage volume
  - Develop specialized staff
  - Develop supplier relationships
  - Maintain professional control
  - Devote resources to selection and negotiation
  - Reduce duplication of tasks
  - Promote standardization

Building the Supply Base

- E-Procurement
  - Speeds purchasing, reduces costs, integrates supply chain
  - **Online catalogs and exchanges**
    - Standard items or industry-specific web sites
  - **Online auctions**
    - Low barriers to entry
    - Reverse auctions for buyers
    - Price not always the most important factor

Logistics Management

- Objective is to obtain efficient operations through the integration of all material acquisition, movement, and storage activities
- Is a frequent candidate for outsourcing
- Allows competitive advantage to be gained through reduced costs and improved customer service

Shipping Systems

- **Trucking**
  - Moves the vast majority of manufactured goods
  - Chief advantage is flexibility
- **Railroads**
  - Capable of carrying large loads
  - Little flexibility though containers and piggybacking have helped with this

Shipping Systems

- **Airfreight**
  - Fast and flexible for light loads
  - May be expensive
- **Waterways**
  - Typically used for bulky, low-value cargo
  - Used when shipping cost is more important than speed

Shipping Systems

- **Pipelines**
  - Used for transporting oil, gas, and other chemical products
- **Multimodal**
  - Combines shipping methods
  - Common, especially in international shipments
  - Aided by standardized containers

Cost and Speed of Shipments

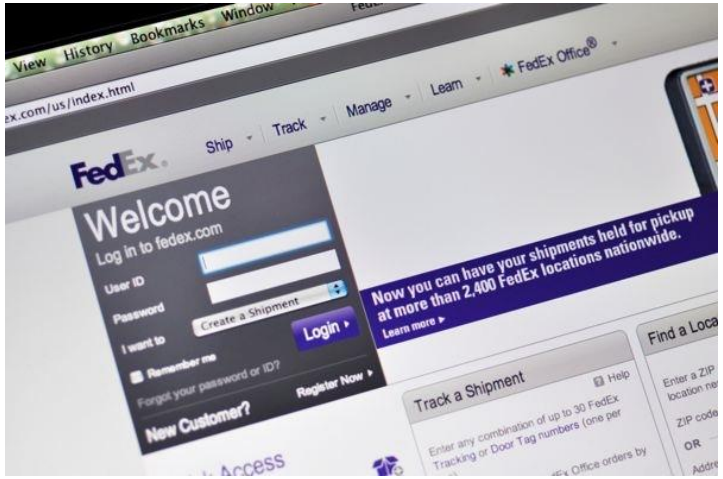
- Faster shipping is generally more expensive than slower shipping
- Faster methods tend to involve smaller shipment sizes while slower methods involve very large shipment sizes

Warehousing

- May be expensive, but alternatives may be more so
- Fundamental purpose is to store goods
- May provide other functions
  - Consolidation
  - Break-bulk
  - Cross-docking
  - Channel assembly

Third-Party Logistics (3PL)

- Outsourcing logistics can reduce inventory, costs, and improve delivery reliability and speed
- Coordinate supplier inventory with delivery services
- May provide warehousing, assembly, testing, shipping, customs



Third-Party Logistics (3PL)

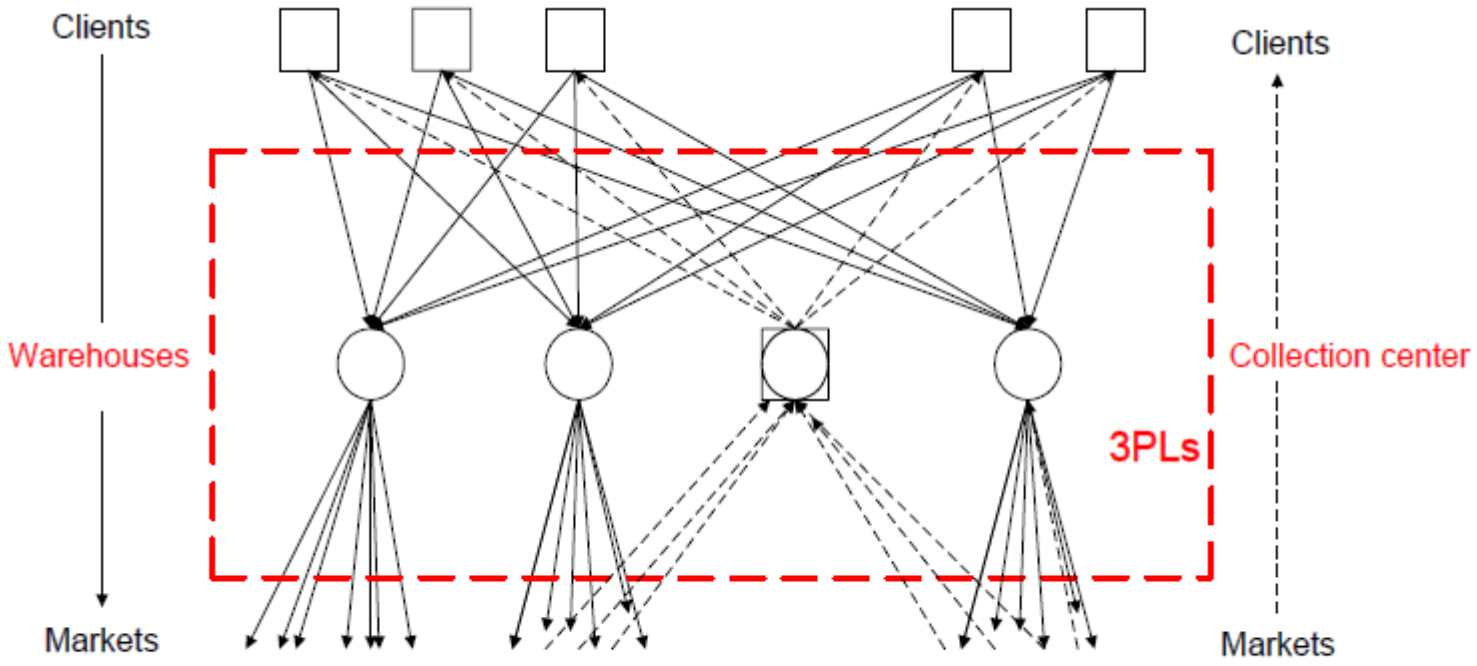
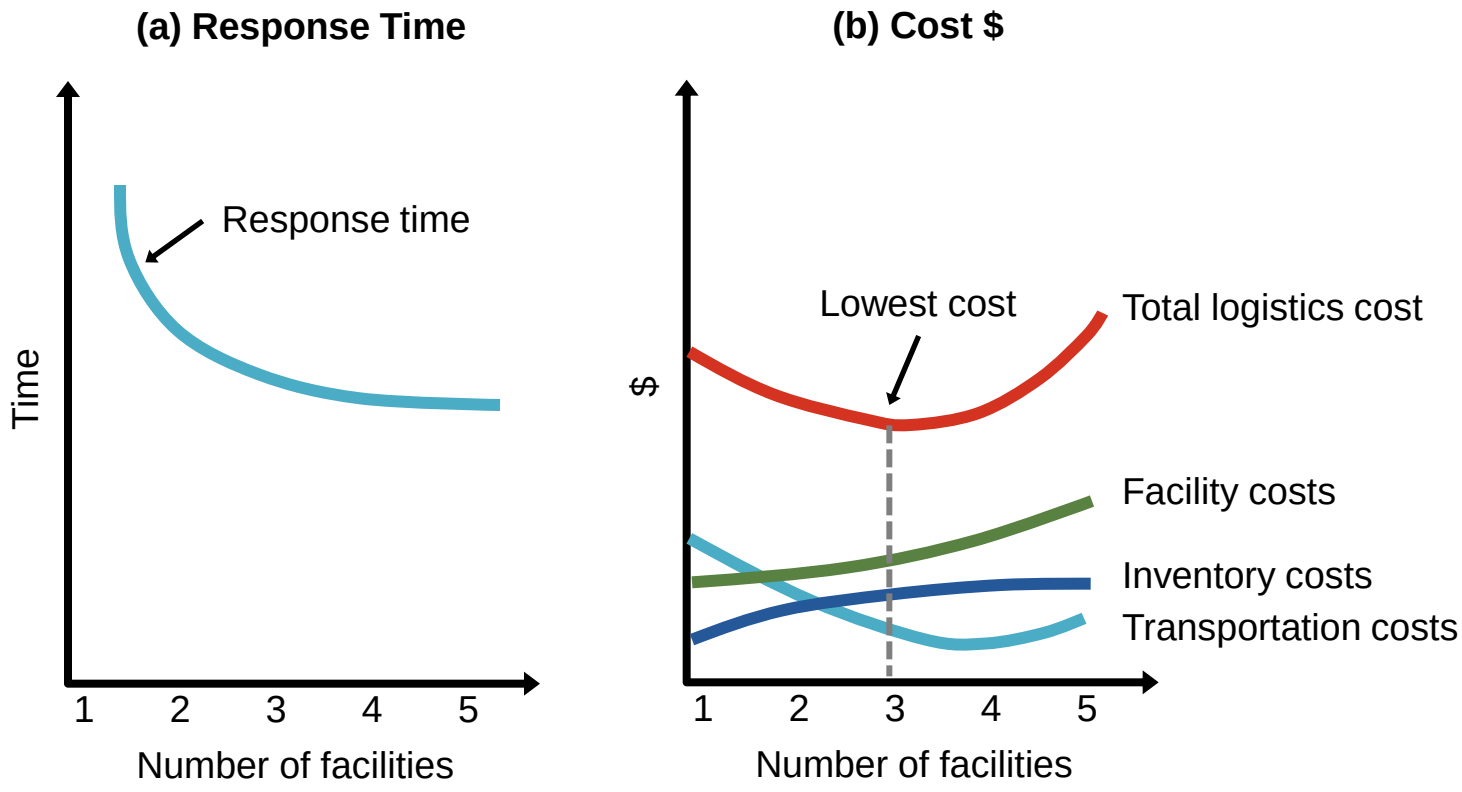


Fig. 1. An integrated network structure.

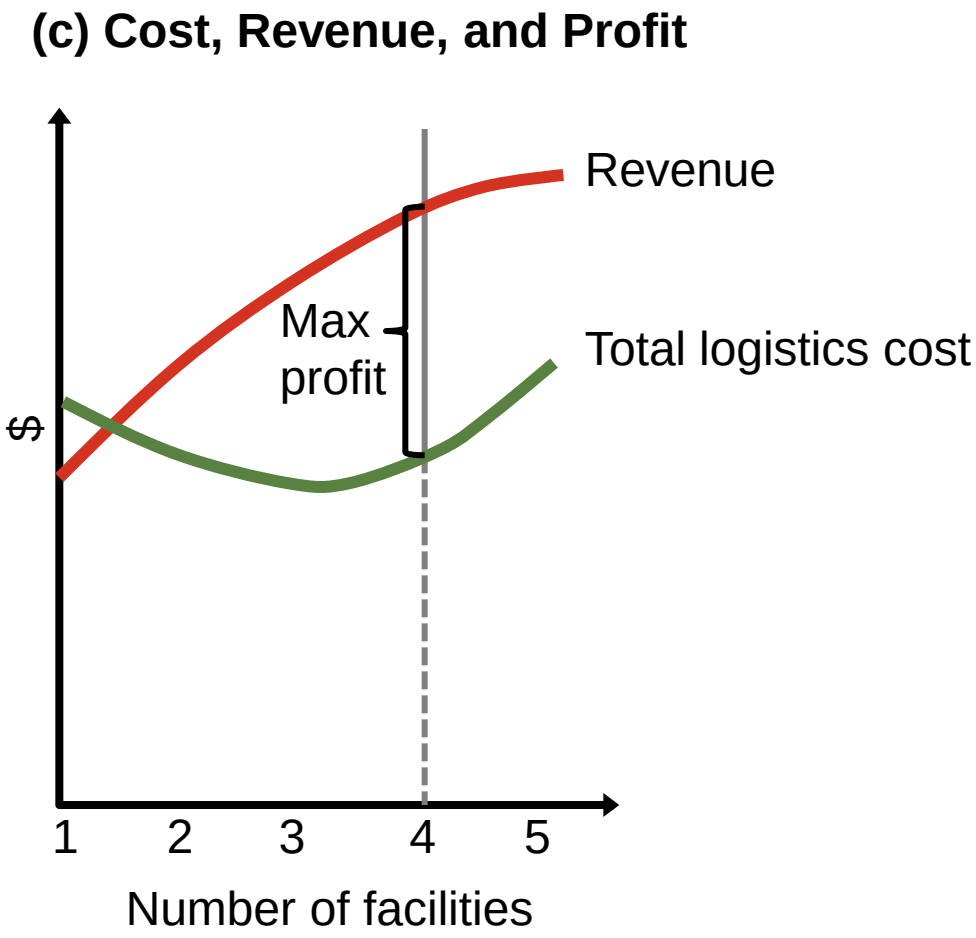
Distribution Management

- The outbound flow of products
  1. Rapid response
  2. Product choice
  3. Service
- Increasing the number of facilities generally improves response time and customer satisfaction
- Total costs are important

Distribution Management



Distribution Management



Distribution Management

- Facilities, packaging, and logistics
- Selection and development of dealers or retailers
- Downstream management as important as upstream management

Ethics and Sustainable Supply Chain Management

- Personal ethics
  - Critical to long term success of an organization
  - Supply chains particularly susceptible
- Ethics within the supply chain
- Ethical behavior regarding the environment

Institute for Supply Management Principles and Standards

- Promote and uphold responsibilities to one's employer; positive supplier and customer relationships; sustainability and social responsibility; protection of confidential and proprietary information; applicable laws, regulations, and trade agreements; and development of professional competence
- Avoid perceived impropriety; conflicts of interest; behaviors that negatively influence supply chain decisions; and improper reciprocal agreements

Establishing Sustainability in Supply Chains

- Return or reverse logistics
  - Sending returned products back up the supply chain for resale, repair, reuse, remanufacture, recycling, or disposal
- Closed-loop supply chain
  - Proactive design of a supply chain that tries to optimize all forward and reverse flows
  - Prepares for returns prior to product introduction

Establishing Sustainability in Supply Chains

- Return or reverse logistics
- Closed-loop supply chain

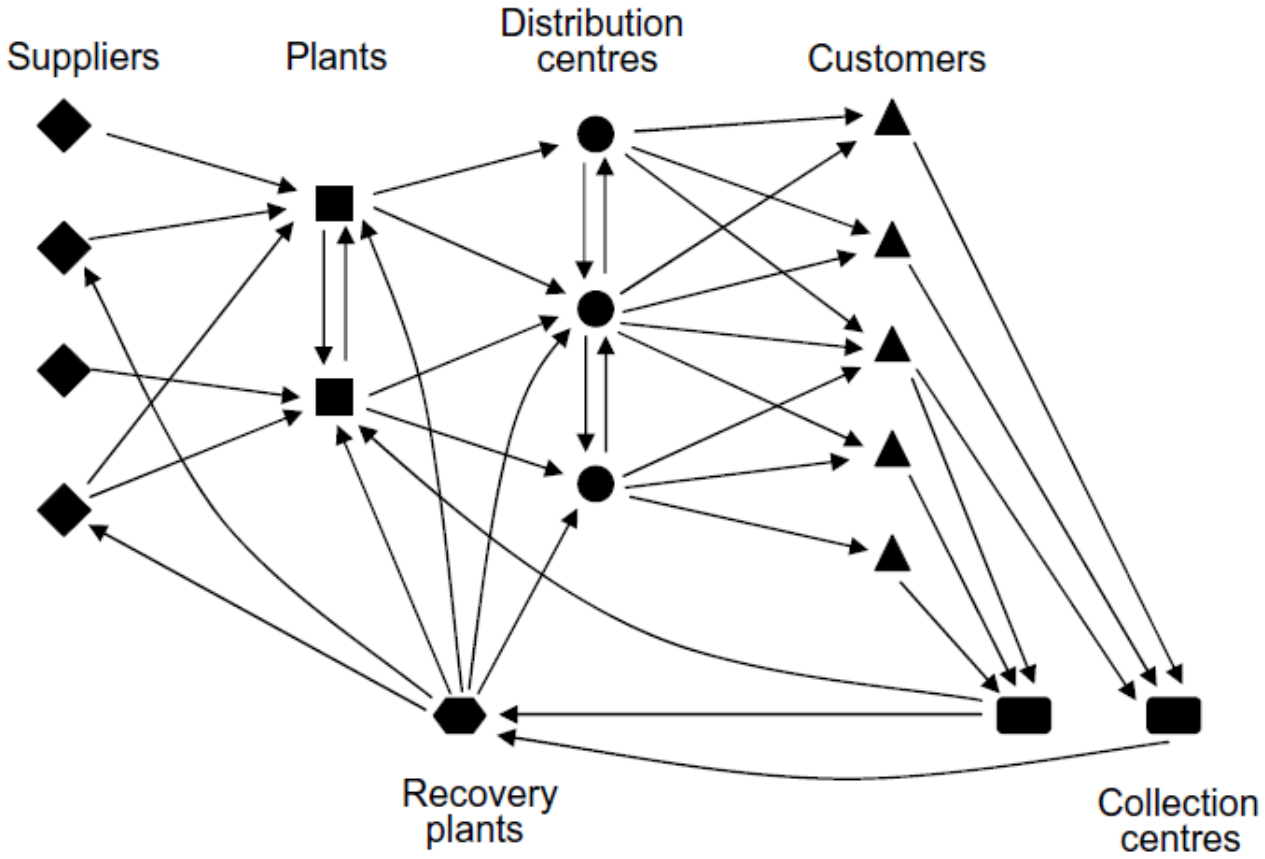


Fig. 1. A generic supply chain network.

Establishing Sustainability in Supply Chains

TABLE Management Challenges of Reverse Logistics

ISSUE	FORWARD LOGISTICS	REVERSE LOGISTICS
Forecasting	Relatively straightforward	More uncertain
Product quality	Uniform	Not uniform
Product packaging	Uniform	Often damaged
Pricing	Relatively uniform	Dependent on many factors
Speed	Often very important	Often not a priority
Distribution costs	Easily visible	Less directly visible
Inventory management	Consistent	Not consistent

Measuring Supply-Chain Performance

- Assets committed to inventory

$$\text{Percentage invested in inventory} = \left(\frac{\text{Total inventory investment}}{\text{Total assets}} \right) \times 100$$

Home Depot had $11.4b inventory, total assets of $44.4b

$$\text{Percentage invested in inventory} = \left(\frac{11.4}{44.4} \right) \times 100 = 25.7\%$$

Measuring Supply-Chain Performance

TABLE

Inventory as Percentage of Total Assets (with examples of exceptional performance)	
Manufacturer (Toyota 5%)	15%
Wholesale (Coca-Cola 2.9%)	34%
Restaurants (McDonald's .05%)	2.9%
Retail (Home Depot 25.7%)	28%

Measuring Supply-Chain Performance

- Inventory turnover

$$\text{Inventory turnover} = \left(\frac{\text{Cost of goods sold}}{\text{Inventory investment}} \right)$$

  - Inventory investment
    - Average of several periods
    - (beginning plus ending)/2
    - Ending inventory

Measuring Supply-Chain Performance

- From PepsiCo, Inc. Annual Report

Net revenue		$32.5
Cost of goods sold		$14.2
Inventory:		
Raw material inventory	$.74	
Work-in-process inventory	$.11	
Finished goods inventory	$.84	
Total inventory investment		$1.69

$$\text{Inventory turnover} = \frac{14.2}{1.69} = 8.4$$

Measuring Supply-Chain Performance

TABLE	Examples of Annual Inventory Turnover
FOOD, BEVERAGE, RETAIL	
Anheuser Busch	15
Coca-Cola	15
Home Depot	5
McDonald's	112
MANUFACTURING	
Dell Computer	90
Johnson controls	22
Toyota (overall)	13
Nissan (assembly)	150

Measuring Supply-Chain Performance

- Weeks of supply

$$\text{Weeks of supply} = \frac{\text{Inventory investment}}{\left(\frac{\text{Annual cost of goods sold}}{52 \text{ weeks}}\right)}$$

For PepsiCo

Inventory investment = $1.69b
Average weekly cost of goods sold = $14.2b / 52 = $.273b

Weeks of supply = 1.69 / .273 = 6.19 weeks

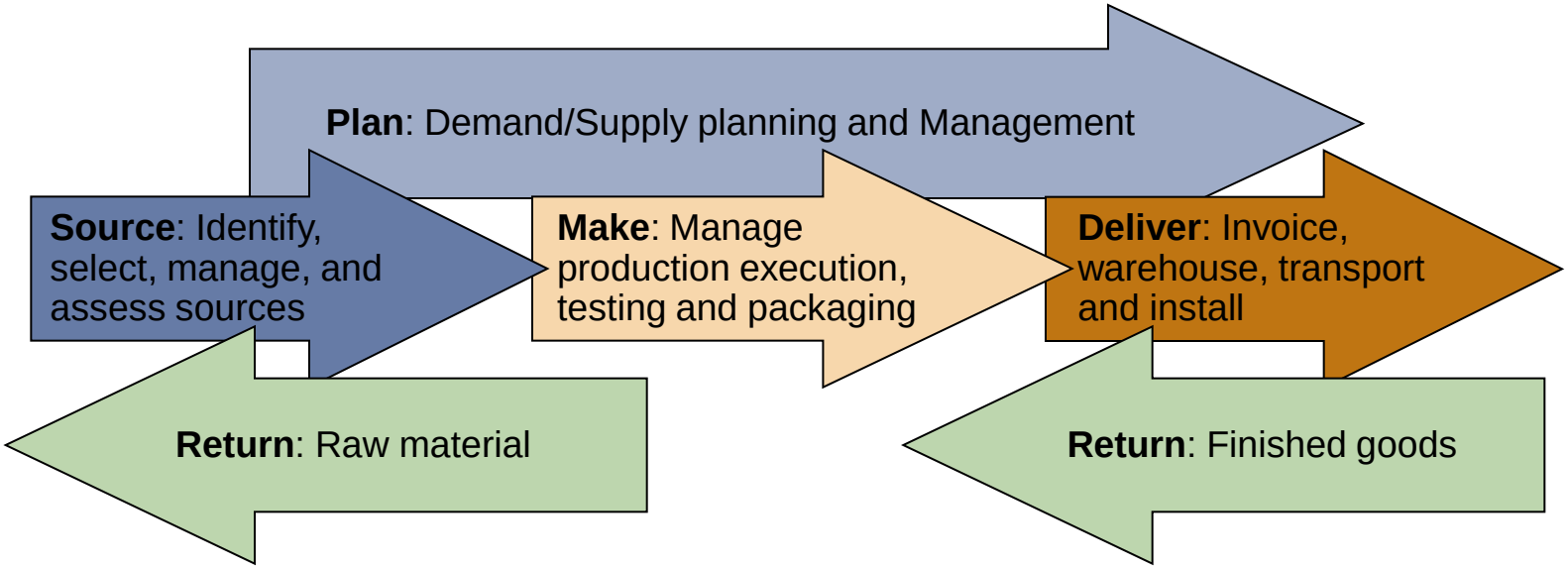
Benchmarking the Supply Chain

- Comparison with benchmark firms

TABLE 11.7	Supply Chain Metrics in the Consumer Packaged Goods Industry	
	TYPICAL FIRMS	BENCHMARK FIRMS
Order fill rate	71%	98%
Oder fulfillment lead time (days)	7	3
Cash-to-cash cycle time (days)	100	30
Inventory days of supply	50	20

The SCOR Model

- Processes, metrics and best practices



The SCOR Model

TABLE	SCOR Model Metrics to Help Firms Benchmark Performance Against the Industry	
PERFORMANCE ATTRIBUTE	**SAMPLE METRIC**	**CALCULATION**
Supply chain reliability	Perfect order fulfillment	(Total perfect orders) / (Total number of orders)
Supply chain responsiveness	Average order fulfillment cycle time	(Sum of actual cycle times for all orders delivered) / (Total number of orders delivered)
Supply chain agility	Upside supply chain flexibility	Time required to achieve an unplanned 20% increase in delivered quantities
Supply chain costs	Supply chain management costs	Cost to plan + Cost to source + Cost to deliver + Cost to return
Supply chain asset management	Cash-to-cash cycle time	Inventory days of supply + Days of receivables outstanding – Days of payables outstanding

Benchmarking the Supply Chain

- Benchmarking useful
- May not be adequate
- Audits may be necessary
  - Continuing communication, Understanding, Trust, Performance, Corporate strategy
- Foster a mutual belief that “we are in this together”