



**SUPPLY CHAIN
MANAGEMENT**
Strategy, Planning, and Operation
FOURTH EDITION

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Chapter 3 Supply Chain Drivers and Metrics



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Outline

- ◆ Impellers of Supply Chain
- ◆ Supply Chain Concepts
- ◆ Drivers of supply chain performance
- ◆ A framework for structuring drivers
- ◆ Facilities
- ◆ Inventory
- ◆ Transportation
- ◆ Information
- ◆ Sourcing
- ◆ Pricing
- ◆ Obstacles to achieving fit

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IMPELLERS OF SUPPLY CHAIN

- ◆ **Empowered Customer**
- ◆ **Developments in Information Technology Tools**
- ◆ **Globalisation**

Drivers of Supply Chain Performance

- ◆ **Facilities**
 - places where inventory is stored, assembled, or fabricated
 - production sites and storage sites
- ◆ **Inventory**
 - raw materials, WIP, finished goods within a supply chain
 - inventory policies
- ◆ **Transportation**
 - moving inventory from point to point in a supply chain
 - combinations of transportation modes and routes
- ◆ **Information**
 - data and analysis regarding inventory, transportation, facilities throughout the supply chain
 - potentially the biggest driver of supply chain performance
- ◆ **Sourcing**
 - functions a firm performs and functions that are outsourced
- ◆ **Pricing**
 - Price associated with goods and services provided by a firm to the supply chain

Facilities

- ◆ Role in the supply chain
 - the “where” of the supply chain
 - manufacturing or storage (warehouses)
- ◆ Role in the competitive strategy
 - economies of scale (efficiency priority)
 - larger number of smaller facilities (responsiveness priority)
- ◆ Example 3.1: Toyota and Honda
 - Both Toyota and Honda use facilities decisions to be more responsive to their customers.
 - These companies have an end goal of opening manufacturing facilities in every major market that they enter

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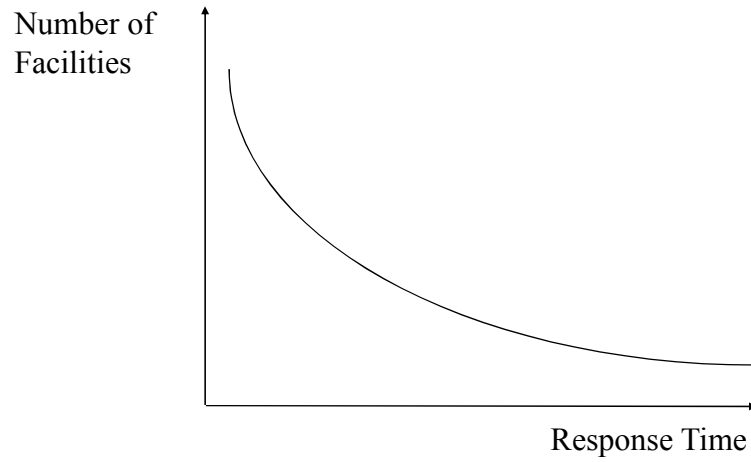
Components of Facilities Decisions

- ◆ Location
 - centralization (efficiency) vs. decentralization (responsiveness)
 - other factors to consider (e.g., proximity to customers)
- ◆ Capacity (flexibility versus efficiency)
- ◆ Overall trade-off: Responsiveness versus efficiency

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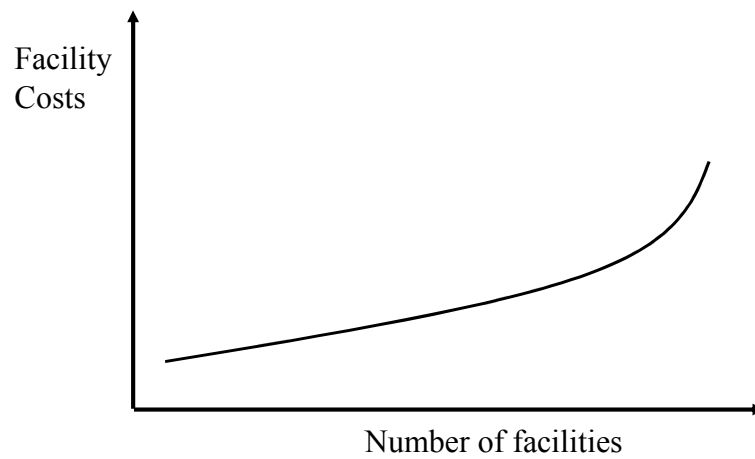
Service and Number of Facilities (Fig. 4.1)



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Facility Costs and Number of Facilities (Fig. 4.4)



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Inventory

- ◆ Role in the supply chain
- ◆ Role in the competitive strategy
- ◆ Components of inventory decisions

Inventory: Role in the Supply Chain

- ◆ Inventory exists because of a mismatch between supply and demand
 - to increase the amount of demand that can be satisfied by having the product ready and available when the customer wants it.
 - to reduce cost by exploiting economies of scale that may exist during production and distribution.
- ◆ Source of cost and influence on responsiveness
- ◆ Impact on
 - material flow time: time elapsed between when material enters the supply chain to when it exits the supply chain
 - throughput
 - » rate at which sales to end consumers occur
 - » $I = DT$ (Little's Law)
 - » I = inventory; D = throughput; T = flow time
 - » Example
 - » Inventory and throughput are “synonymous” in a supply chain

Inventory: Role in Competitive Strategy

- ◆ If responsiveness is a strategic competitive priority, a firm can locate larger amounts of inventory closer to customers
- ◆ If cost is more important, inventory can be reduced to make the firm more efficient
- ◆ Trade-off
- ◆ Example 3.2 – Nordstrom

Nordstrom

- ◆ Nordstrom's competitive strategy targets upper-end customers with high responsiveness requirements.
- ◆ These customers are willing to pay a premium to have the products they want when they want them.
- ◆ To support this competitive strategy, Nordstrom uses inventory; the company stocks a large variety and quantity of products to ensure a high level of availability.
- ◆ In fact, Nordstrom stocks a significantly larger amount of inventory than other stores.
- ◆ Nordstrom incurs higher costs because of its large inventory, but it gains extra margin from its customers, who are willing to pay for the level of service that Nordstrom's inventory makes possible.

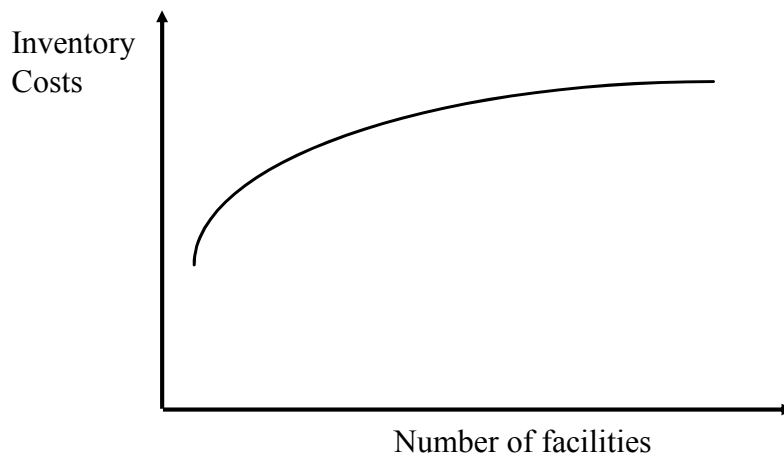
Components of Inventory Decisions

- ◆ Cycle inventory
 - Average amount of inventory used to satisfy demand between shipments
 - Depends on lot size
- ◆ Safety inventory
 - inventory held in case demand exceeds expectations
 - costs of carrying too much inventory versus cost of losing sales
- ◆ Seasonal inventory
 - inventory built up to counter predictable variability in demand
 - cost of carrying additional inventory versus cost of flexible production
- ◆ Overall trade-off: Responsiveness versus efficiency
 - more inventory: greater responsiveness but greater cost
 - less inventory: lower cost but lower responsiveness

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Inventory Costs and Number of Facilities (Fig. 4.2)



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Transportation

- ◆ Role in the supply chain
- ◆ Role in the competitive strategy
- ◆ Components of transportation decisions

Transportation: Role in the Supply Chain

- ◆ Moves the product between stages in the supply chain
- ◆ Impact on responsiveness and efficiency
- ◆ Faster transportation allows greater responsiveness but lower efficiency
- ◆ Also affects inventory and facilities

Transportation: Role in the Competitive Strategy

- ◆ If responsiveness is a strategic competitive priority, then faster transportation modes can provide greater responsiveness to customers who are willing to pay for it
- ◆ Can also use slower transportation modes for customers whose priority is price (cost)
- ◆ Can also consider both inventory and transportation to find the right balance

Laura Ashley

- ◆ Laura Ashley sells clothing and other household items through a mail-order catalog and uses transportation as part of its competitive strategy.
- ◆ Laura Ashley's customers are willing to pay a premium price for a high level of responsiveness.
- ◆ To meet this level of responsiveness, the company has located its main warehouse near the FedEx hub in Memphis, Tennessee, to better utilize the responsive transportation that FedEx offers.
- ◆ When an order is placed, the goods are easily and quickly sent from the Laura Ashley warehouse to the FedEx hub, where they are sent overnight to the customer.
- ◆ This transportation policy enables Laura Ashley's customers to order their goods later than they can at other companies and still receive them next day.

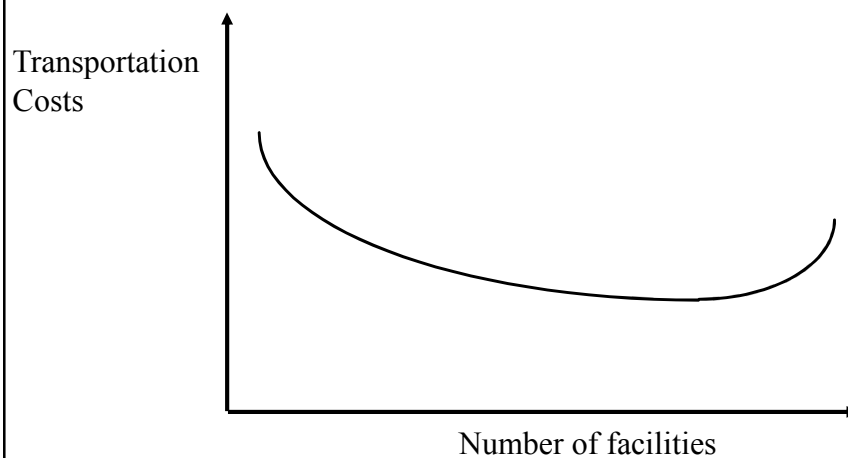
Components of Transportation Decisions

- ◆ Mode of transportation:
 - air, truck, rail, ship, pipeline, electronic transportation
 - vary in cost, speed, size of shipment, flexibility
- ◆ Route and network selection
 - route: path along which a product is shipped
 - network: collection of locations and routes
- ◆ In-house or outsource
- ◆ Overall trade-off: Responsiveness versus efficiency

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Transportation Costs and Number of Facilities (Fig. 4.3)



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Information

- ◆ Role in the supply chain
- ◆ Role in the competitive strategy
- ◆ Components of information decisions

Information: Role in the Supply Chain

- ◆ The connection between the various stages in the supply chain – allows coordination between stages
- ◆ Crucial to daily operation of each stage in a supply chain – e.g., production scheduling, inventory levels

Information: Role in the Competitive Strategy

- ◆ Allows supply chain to become more efficient and more responsive at the same time (reduces the need for a trade-off)
- ◆ Information technology
- ◆ What information is most valuable?
- ◆ Example 3.4: Andersen Windows

Andersen Windows

- ◆ Andersen Windows, a major manufacturer of residential wood windows located in Bayport, Minnesota, has invested in an information system that enables the company to bring customized products to the market rapidly.
- ◆ This system, called "Window of Knowledge," allows distributors and customers to design windows to custom-fit their needs.
- ◆ Users can select from a library of over 50,000 components that can be combined in any number of ways.
- ◆ The system immediately gives the customer price quotes and automatically sends the order to the factory if the customer decides to buy.
- ◆ This information investment not only gives the customer a much wider variety of products, it allows Andersen to be much more responsive to the customer, as it gets the customer's order to the factory as soon as the order is placed.

Components of Information Decisions

- ◆ Push (MRP) versus pull (demand information transmitted quickly throughout the supply chain)
- ◆ Coordination and information sharing
- ◆ Forecasting and aggregate planning
- ◆ Enabling technologies
 - EDI
 - Internet
 - ERP systems
 - Supply Chain Management software
- ◆ Overall trade-off: Responsiveness versus efficiency

Sourcing

- ◆ Role in the supply chain
- ◆ Role in the competitive strategy
- ◆ Components of sourcing decisions

Sourcing: Role in the Supply Chain

- ◆ Set of business processes required to purchase goods and services in a supply chain
- ◆ Supplier selection, single vs. multiple suppliers, contract negotiation

Sourcing: Role in the Competitive Strategy

- ◆ Sourcing decisions are crucial because they affect the level of efficiency and responsiveness in a supply chain
- ◆ In-house vs. outsource decisions- improving efficiency and responsiveness

Cisco

- ◆ Cisco has outsourced almost all of its manufacturing.
- ◆ It does, however, have a sourcing strategy that varies by product type.
- ◆ For low-end products such as routers for home networks, Cisco aims for efficiency.
 - These routers are produced and packed in China and shipped in bulk for sale in the United States.
 - Cisco aims for the lowest-cost manufacturing location and economies of scale in transportation because the targeted market segment values low cost.
- ◆ For high-end products, in contrast, Cisco outsources to contract manufacturers in the United States.
 - These manufacturers are not cheap but they are responsive and can serve the rapidly evolving needs of the high-end market

Components of Sourcing Decisions

- ◆ In-house versus outsource decisions
 - It is best to outsource if the growth in total supply chain profit is significant with little additional risk.
 - Within a task such as transportation, managers must decide
 - » whether to outsource all of it,
 - » outsource only the responsive component, or
 - » outsource only the efficient component.
- ◆ Supplier evaluation and selection (Direct Negotiation or Auction)
- ◆ Procurement process.
 - Managers must decide on the structure of procurement of direct as well as indirect materials, and strategic as well as general materials.
- ◆ Overall trade-off: Increase the supply chain profits

Pricing

- ◆ Role in the supply chain
- ◆ Role in the competitive strategy
- ◆ Components of pricing decisions

Pricing: Role in the Supply Chain

- ◆ Pricing determines the amount to charge customers in a supply chain
- ◆ Pricing strategies can be used to match demand and supply

Pricing: Role in the Competitive Strategy

- ◆ Firms can utilize optimal pricing strategies to improve efficiency and responsiveness
- ◆ Low price and low product availability; vary prices by response times

Amazon.com

- ◆ Amazon offers its customers a large menu of prices for products that are purchased from the company.
 - For example, in November 2005, a person purchasing two books worth \$30 could use standard shipping (ships in 3-5 business days) at a cost of \$4.98, two-day shipping (ships in 2 business days) at a cost of \$11.47, one-day shipping (ships in 1 business day) at a cost of \$20.47 or use free shipping (ships in 7-14 business days).
- ◆ The pricing menu allows Amazon to attract customers with varying levels of desired responsiveness.
 - Whereas customers paying for one-day shipping impose a high degree of uncertainty on Amazon,
 - customers opting for free shipping can be used to level out the workload at the warehouse over time.
 - Amazon can thus use its pricing to provide responsiveness to those who value it while using those who want to a low price to help it improve its efficiency.
- ◆ Amazon also uses pricing effectively to shift some of the Christmas peak to November, when it usually offers a discount on shipping.
 - The discount moves some of the December demand forward, allowing it to reduce its December peak and improve its efficiency without giving up on responsiveness for those customers who do not want to order earlier.

Components of Pricing Decisions

- ◆ Pricing and economies of scale
- ◆ Everyday low pricing versus high-low pricing
- ◆ Fixed price versus menu pricing
- ◆ Overall trade-off: Increase the firm profits

Summary

- ◆ What are the major drivers of supply chain performance?
- ◆ What is the role of each driver in creating strategic fit between supply chain strategy and competitive strategy (or between implied demand uncertainty and supply chain responsiveness)?
- ◆ What are the major obstacles to achieving strategic fit?
- ◆ In the remainder of the course, we will learn how to make decisions with respect to these drivers in order to achieve strategic fit and surmount these obstacles