

— NETWORK DESIGN

Module 6 Week 6




SCM 614

TIFFANY & CO.

Major jewellers to cease buying Russian-origin diamonds after increased

In USD millions except per share amounts	Trend	<	2016	2015	2014	2013	2012	2011
<i>Period Ended</i>			<i>2016-01-31</i>	<i>2015-01-31</i>	<i>2014-01-31</i>	<i>2013-01-31</i>	<i>2012-01-31</i>	<i>2011-01-31</i>
Operating Revenue			4,104.9	4,249.9	4,031.1	3,794.2	3,642.9	3,085.3
Cost of Revenue			1,613.6	1,712.7	1,690.7	1,631.0	1,491.8	1,263.0
Gross Profit			2,491.3	2,537.2	2,340.4	2,163.3	2,151.2	1,822.3

diamonds-after-increased-scrutiny

In USD millions except per share amounts	Trend	<	2020	2019	2018	2017	2016	2015
<i>Period Ended</i>			<i>2020-01-31</i>	<i>2019-01-31</i>	<i>2018-01-31</i>	<i>2017-01-31</i>	<i>2016-01-31</i>	<i>2015-01-31</i>
Operating Revenue			4,424.0	4,442.1	4,169.8	4,001.8	4,104.9	4,249.9
Cost of Revenue			1,662.1	1,631.1	1,559.1	1,502.8	1,613.6	1,712.7
Gross Profit			2,761.9	2,811.0	2,610.7	2,499.0	2,491.3	2,537.2

- \$4.4B revenue annually; average gross profit \$2.5B over last 10 years
- Revenue growth from 2009 to 2019 63.27%



Agenda

- Case #4: Teams choose case
- Chapter 4: Designing Distribution Networks
- Chapter 5: Network Design in the Supply Chain (skip modeling details)
- Lexus network study (network optimization project)
- ~~Chapter 6: Design Global SC Networks: Cost, Risk, Decision Trees~~ See video
- What's up for next week

Case #4 Teams

Ang, Paul	1
Collier, Nicole	1
Euceda Iscoa, Marlon	1
Magallon, Dominick	1
Alramahi, Ehab	2
Gonzalez-Aguayo, Gisela	2
Kariuki, Janet	2
Rodgers, Samuel	2
Alfaro, Marugenia	3
Han, Chris	3
Khachatryan, Marieta	3
Sampson, Ivy	3
Ahadiat, Parisa	4
Ghazaryan, Shushanik	4
Khafajizadeh, Bina	4
Redfearn, Joe	4

Beisecker, Kelsey	5
Freeman, Annie	5
Joshua, Jonathan	5
Matthews, Olivia	5
Contreras, Stephanie	6
Guelff, Michelle	6
Ramirez, Lizbeth	6
Weiss-Varela, Samantha	6
Galleta, Beda	7
Nguyen, Jessica	7
Perez, Melissa	7
Vidovich, Mikaela	7
Bui, Cindy	8
Dizon, Ric	8
Lopez, Ruben	8
Wand, Kelly	8

Case #4

- Pick one project
 - Multiple teams can work on the same study (2 max)
 - Your team has been tasked to make recommendations and present a report to exec mgmt.
- Deliverables
 - 5-6 page report, plus references
 - Tables/charts; explain any calculations
 - Record presentation – will show on 5/11 before final
 - 5 minutes!! Very short
 - Everyone should contribute
 - Post to dropbox (file or link)
 - Brief Q&A will follow

Case #4

Network design for solar panels

Your solar panel company has 90% of its product sourced from China. No production is done in the US currently. Sourcing decisions were made over 20 years ago when China was a low-cost labor country. As costs have risen (manufacturing, labor, transportation), margins are taking a hit, and profits are down. Supply chain disruptions caused by the pandemic have led to lost sales from long-standing customers – customers that were hard-won in the first place. Adding to supply chain uncertainty and cost escalation, the Defense Production Act is expected to create additional challenges in future supply.

Your team has been tasked with heading up a review of the global network design and sourcing strategy. The deliverables include a *report to senior management* which includes:

- Recommendations for source changes (why/where). Do changes impact other logistical functions? Explain.
- Impacts of changes on cost/profits/fill rate/inventory/etc. for a product line. (Not asking for detailed \$ but directionality and considerations)
- Project plan for changes.



Case #4

Vulnerable supply chains in America

“On February 24, 2021, the President signed EO 14017, directing a whole-of-government approach to assessing vulnerabilities in, and strengthening the resilience of, critical supply chains.”

(<https://www.whitehouse.gov/briefing-room/statements-releases/2021/06/08/fact-sheet-biden-harris-administration-announces-supply-chain-disruptions-task-force-to-address-short-term-supply-chain-discontinuities/>) Biden’s appointed research team found four categories that required immediate action to promote economic and national security: semiconductors, large-scale batteries, pharmaceuticals, and rare earth elements. Your team works for ABC Minerals, which has just found a new store of rare earths on US soil. (The company can be existing or fictitious – your choice. Several different companies have made findings recently.) Write a *report for senior management* that includes the following:

- An investigation of the current supply chain(s) and why it is critical to near shore.
- Potential “to-be” supply chains and challenges.
- Measures to limit environmental impacts in the physical mining and logistics functions.
- Cost/benefit analysis of nearshoring supply. (Not asking for detailed \$ but directionality and considerations) Will the undertaking require incentives from the government?

(If rare earth minerals are not your gig, the team may choose batteries, semiconductors, or pharmaceuticals. Similar questions, but for different commodity(ies) – adjust as necessary.)



<https://www.marioncountyky.com/service/extraction/>

Case #4

Nissan – building resiliency

Nissan and other Japanese auto manufacturers were severely impacted by the tsunami in 2011. The earthquake and flooding took lives and devastated businesses leading to global supply chain disruptions. (See case study.)

Your team has been hired by another vehicle manufacturer and wants to know how Nissan responded to the event and risk mitigation going forward. Write a *report for their senior management* answering questions 1-5 at the end of the case, making sure to include the following:

- Any missing responses or future risk mitigation efforts that auto manufacturers should include for supply chain resilience.
- What should firms (in general, not just automotive) include in their risk management planning?
- If an incident has a low potential for occurring, do firms need to address it?
- What is the cost and benefit of risk mitigation? (Not asking for detailed \$ but directionality and considerations)



<https://www.nissanusa.com/>



<https://www.gartner.com/peer-insights/home>

The best of the best

Your team works for a medium-sized consumer products company that sources globally and distributes products in the US and Canada. Senior management wants a game plan for improving the supply chain. The team has leeway here to “create” a fictitious company, product(s), and supply chain; just be realistic and descriptive. (Feel free to model it based on an existing company making sure to include references.)

Gartner publishes lists of companies with outstanding supply chains yearly. (See <https://www.gartner.com/en/articles/the-gartner-supply-chain-top-25-for-2022>) Examine what makes them great taking this list *as a starting point*. (The team might decide that other companies are better suited to provide benchmarking for this project/industry – your choice – just back it up.) Write a *report for senior management* on what steps the firm should make in the near-term (1 year) and long term (3+ years) with the ultimate goal of being one of the “great” supply chain firms. Make sure to:

- Break into long- and short-term objectives (plus connections between the two).
- Include climate change/sustainability.
- Make a SWOT analysis of the company (to help focus the discussion).
- Identify the objectives and describe the process(es) required for change/improvement. Be specific and include what metrics the team recommends for tracking progress.

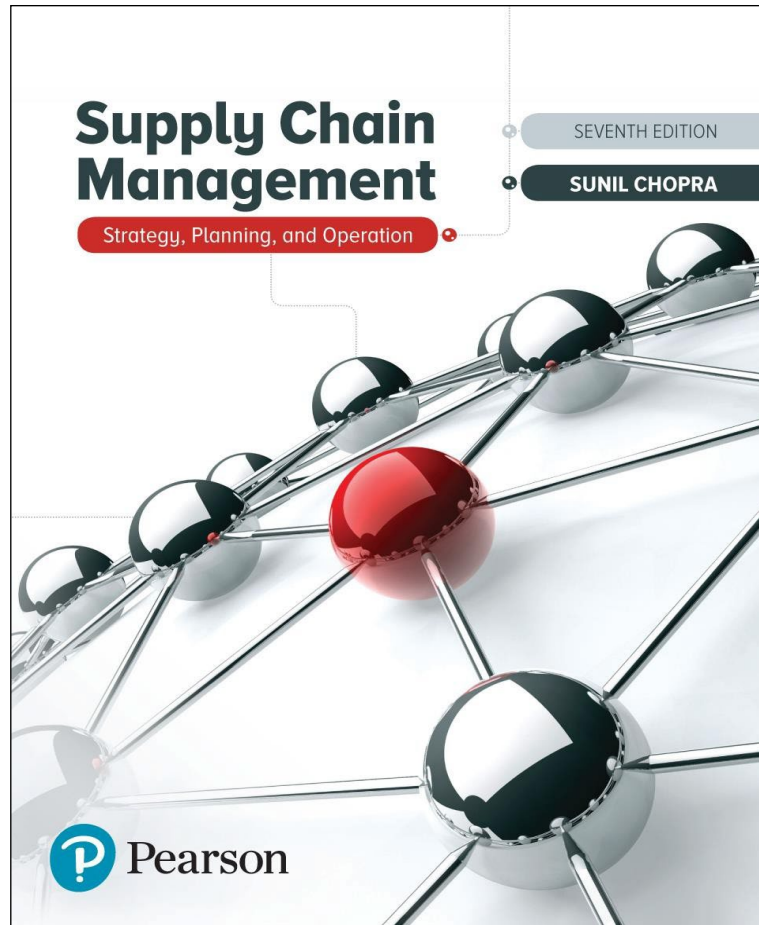
Case 4 team breakout: decide on project (rank 1-3)



<https://967theeagle.net/wheel-of-fortune-contestant-solves-after-two-letters-what-video/>

Supply Chain Management: Strategy, Planning, and Operation

Seventh Edition



Chapter 4

Designing Distribution
Networks and Applications
to Omni-Channel Retailing

Distribution Network Design in the Supply Chain

- **Distribution** – the steps taken to move and store a product from the supplier stage to the customer stage in a supply chain
- Drives profitability by directly affecting supply chain cost and the customer value
- Choice of distribution network can achieve supply chain objectives from low cost to high responsiveness

Factors Affecting Distribution Network Design

(1 of 2)

- Distribution network performance evaluated along two dimensions
 1. Value provided to the customer
 2. Cost of meeting customer needs
- Evaluate the impact on customer service and cost for different distribution network options
- Profitability of the delivery network determined by revenue from met customer needs and network costs

Factors Affecting Distribution Network Design

(2 of 2)

- Elements of customer service influenced by network structure:
 - Response time
 - Product variety
 - Product availability
 - Customer experience
 - Time to market
 - Order visibility
 - Returnability
- Supply chain costs affected by network structure:
 - Inventories
 - Transportation
 - Facilities
 - Information

Desired Response Time and Number of Facilities

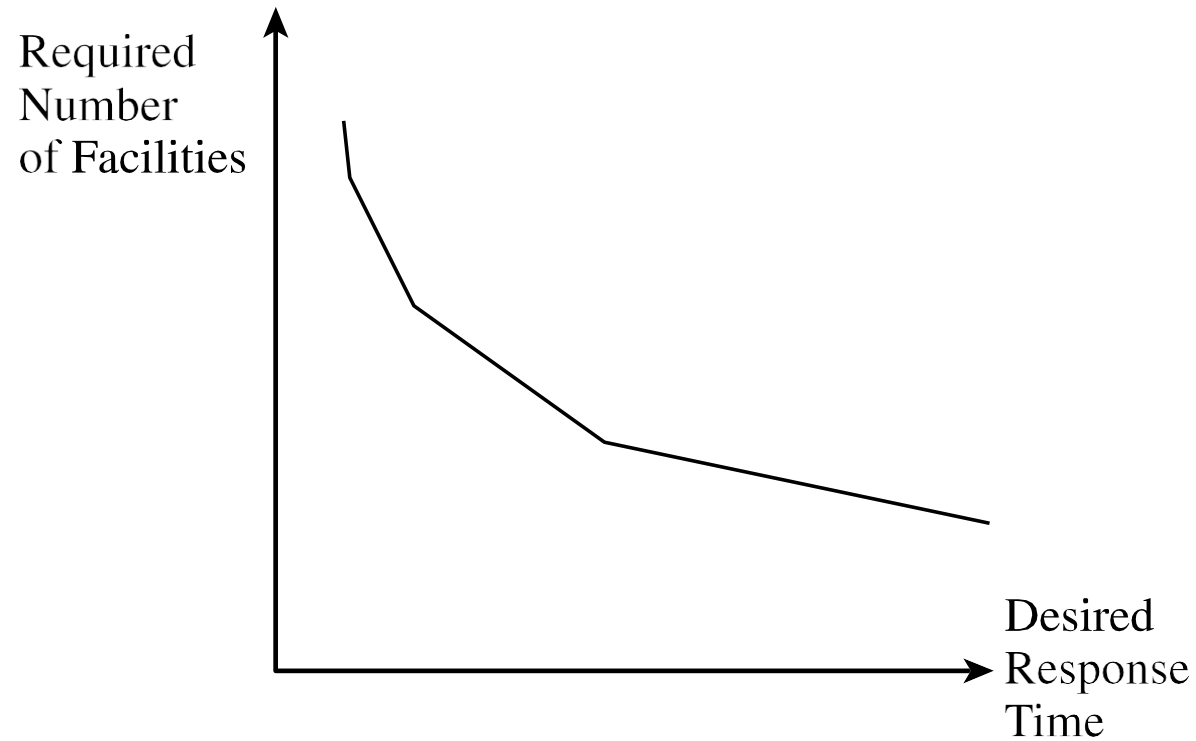


Figure 4-1 Relationship Between Desired Response Time and Number of Facilities

Inventory Costs and Number of Facilities

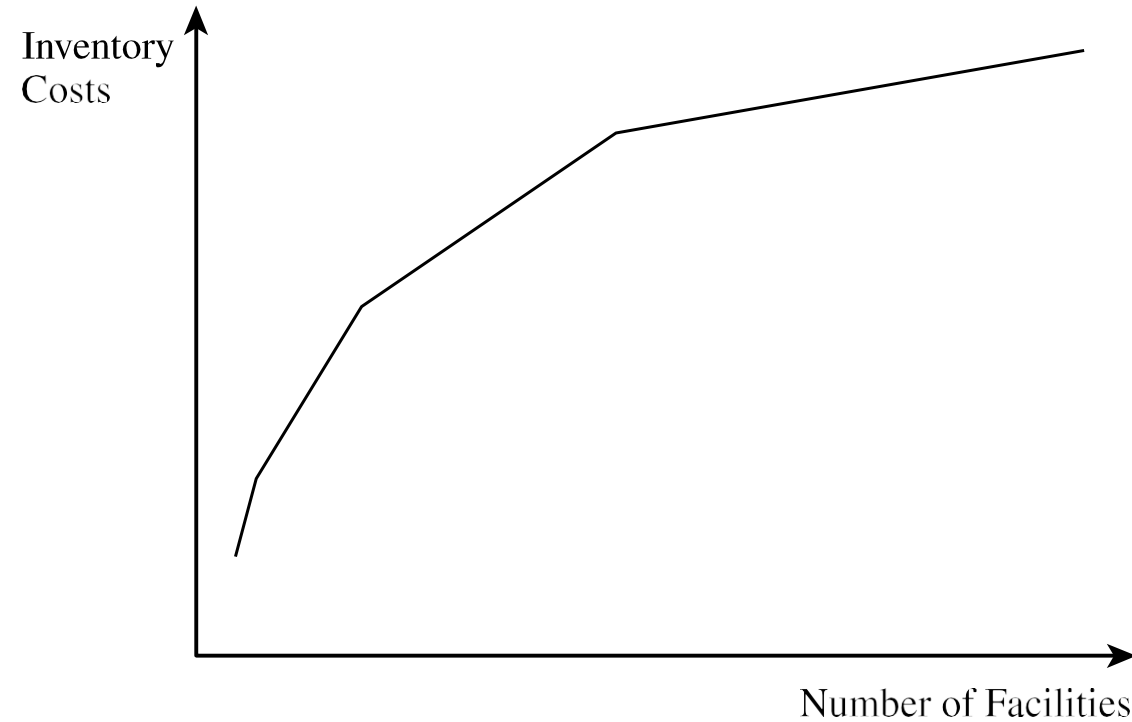


Figure 4-2 Relationship Between Number of Facilities and Inventory Costs

Transportation Costs and Number of Facilities

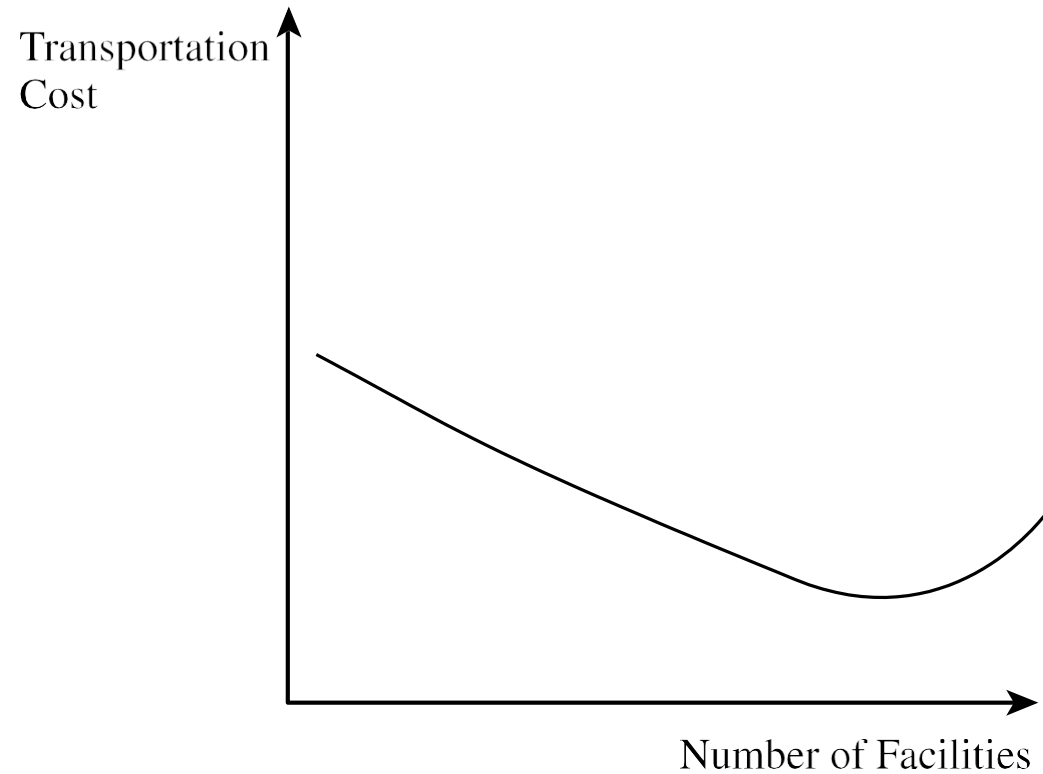


Figure 4-3 Relationship Between Number of Facilities and Transportation Cost

Facility Costs and Number of Facilities

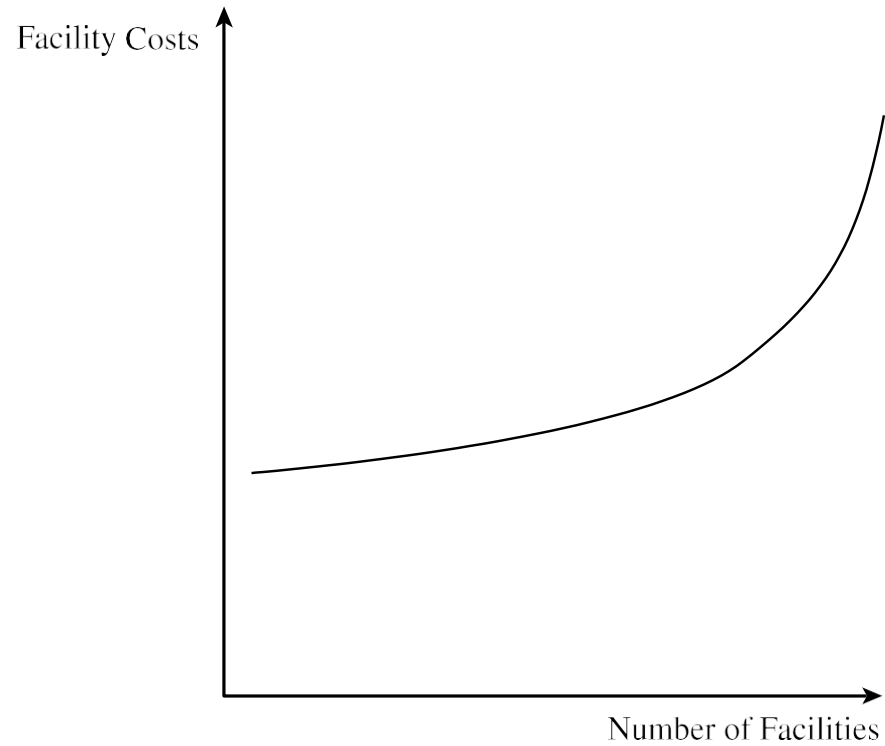


Figure 4-4 Relationship Between Number of Facilities and Facility Costs

Logistics Cost, Response Time, and Number of Facilities

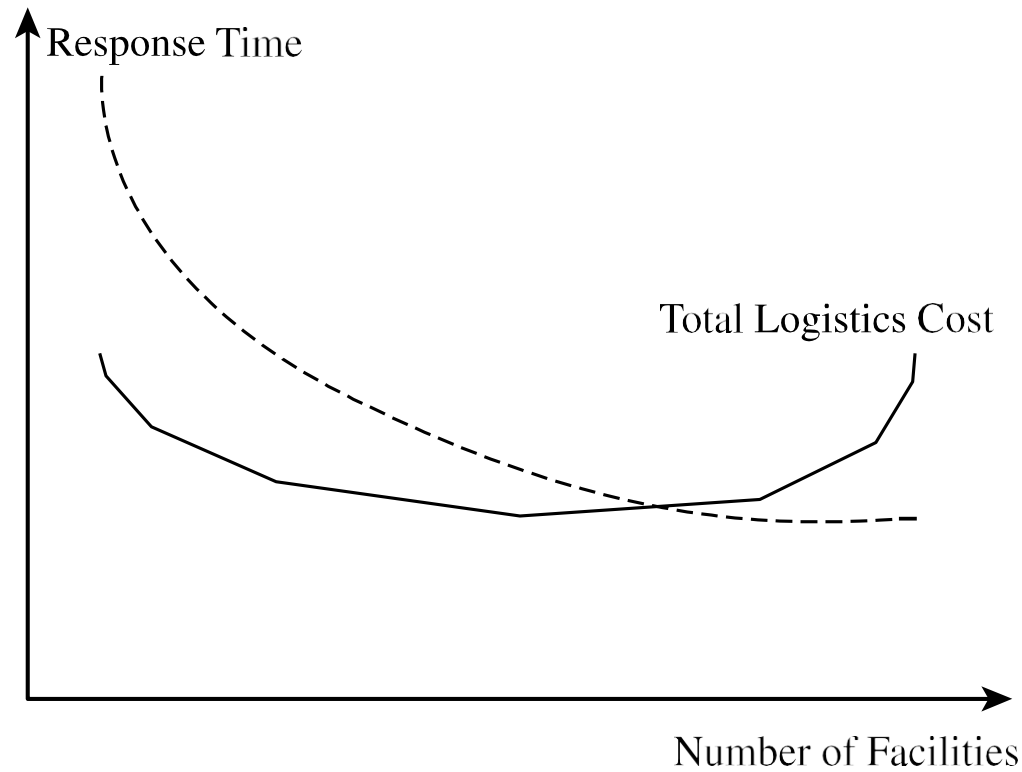
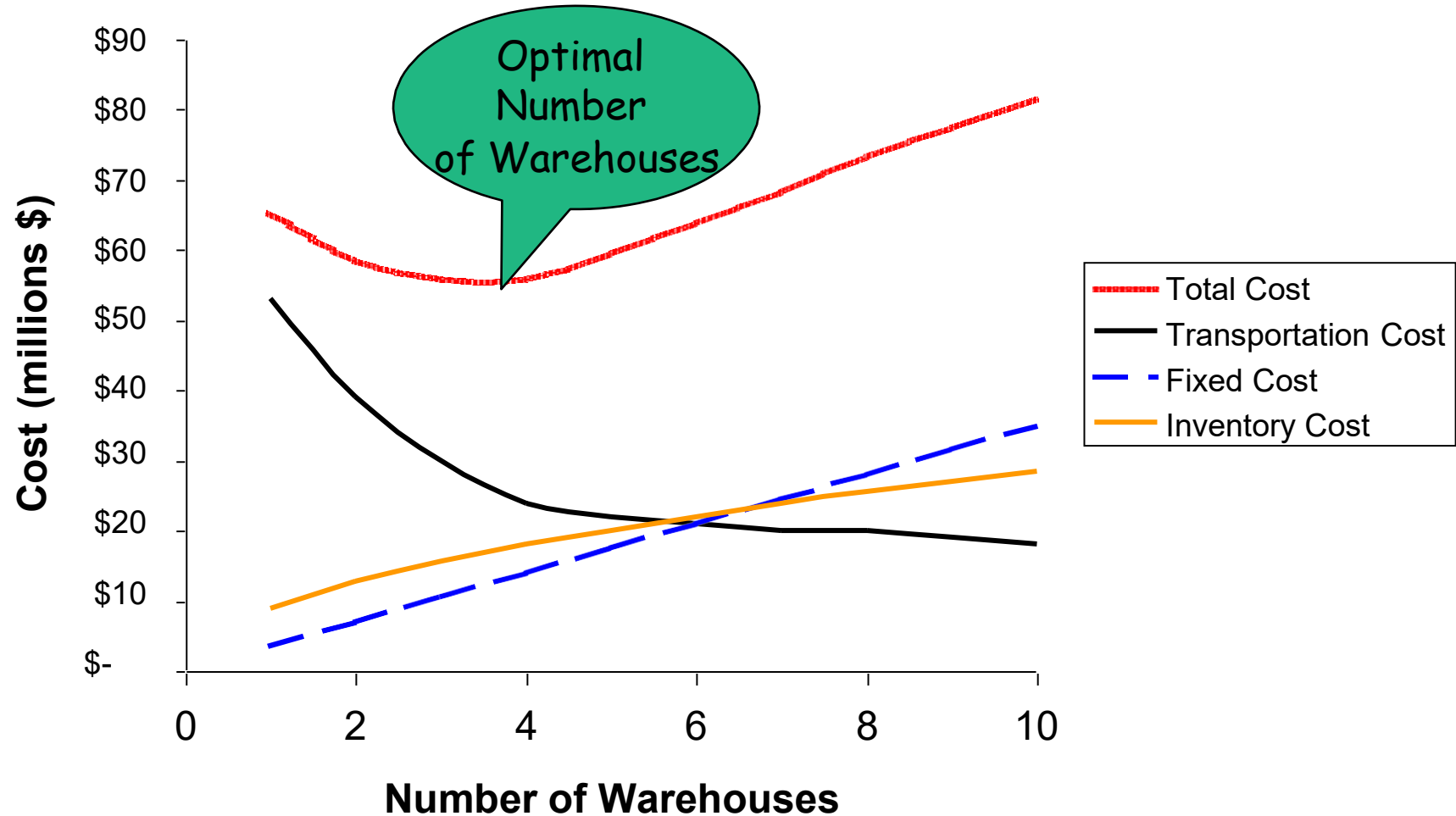


Figure 4-5 Variation in Logistics Cost and Response Time with Number of Facilities

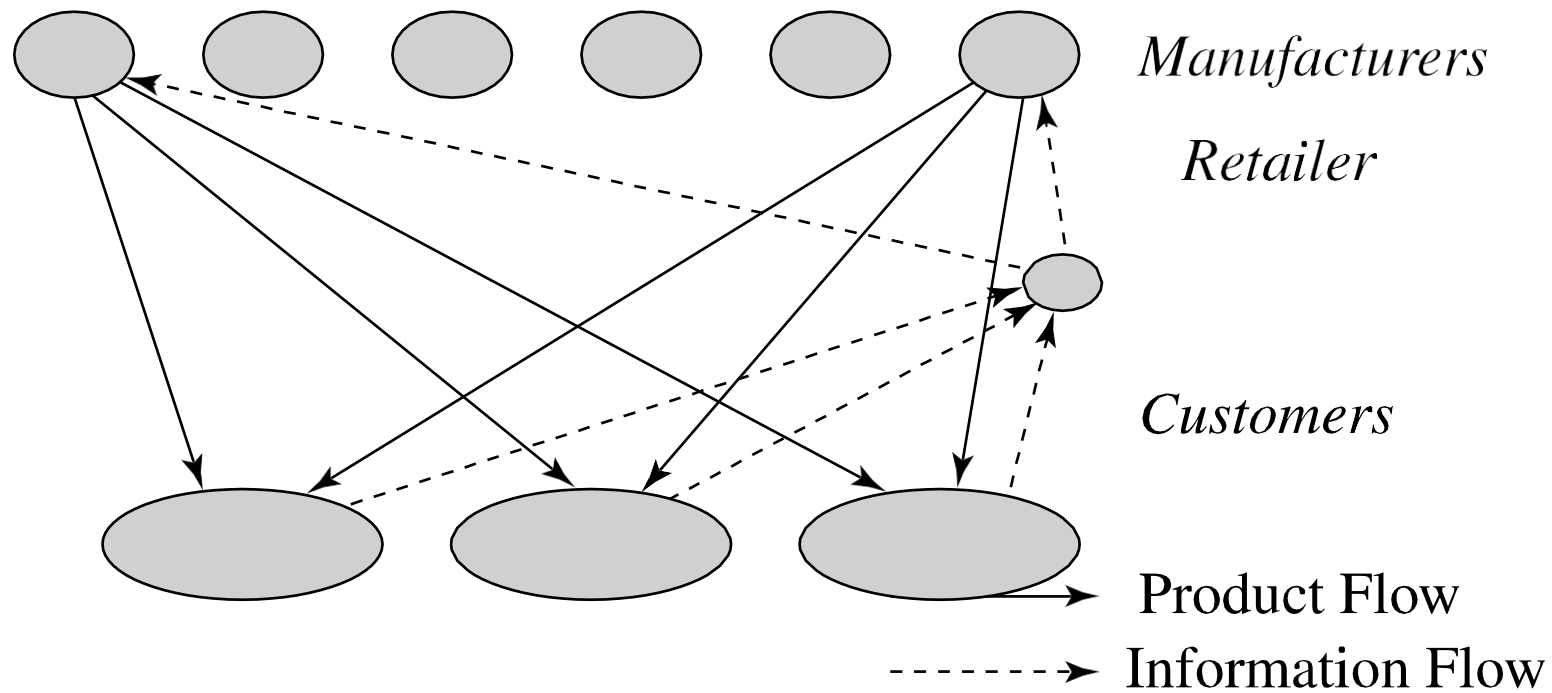
Minimize the cost of your logistics network without compromising your service levels



Design Options for a Distribution Network

- Distribution network choices from the manufacturer to the end consumer
- Two key decisions
 1. Will product be delivered to the customer location or picked up from a prearranged site?
 2. Will product flow through an intermediary (or intermediate location)?
- One of six designs may be used
 1. Manufacturer storage with direct shipping
 2. Manufacturer storage with direct shipping and in-transit merge
 3. Distributor storage with carrier delivery
 4. Distributor storage with last-mile delivery
 5. Manufacturer/distributor storage with customer pickup
 6. Retail storage with customer pickup

Figure 4-6 Manufacturer Storage with Direct Shipping



Manufacturer Storage with Direct Shipping Network (1 of 2)

Table 4-1 Performance Characteristics of Manufacturer Storage with Direct Shipping Network

Cost Factor	Performance
Inventory	Lower costs because of aggregation. Benefits of aggregation are highest for low-demand, high-value items. Benefits are large if product customization can be postponed at the manufacturer.
Transportation	Higher transportation costs because of increased distance and disaggregate shipping.
Facilities and handling	Lower facility costs because of aggregation. Some saving on handling costs if manufacturer can manage small shipments or ship from production line.
Information	Significant investment in information infrastructure to integrate manufacturer and retailer.

Manufacturer Storage with Direct Shipping Network (2 of 2)

Table 4-1 [Continued]

Service Factor	Performance
Response time	Long response time of one to two weeks because of increased distance and two stages for order processing. Response time may vary by product, thus complicating receiving.
Product variety	Easy to provide a high level of variety.
Product availability	Easy to provide a high level of product availability because of aggregation at manufacturer.
Customer experience	Good in terms of home delivery but can suffer if order from several manufacturers is sent as partial shipments.
Time to market	Fast, with the product available as soon as the first unit is produced.
Order visibility	More difficult but also more important from a customer service perspective.
Returnability	Expensive and difficult to implement.

TOP 6 ADVANTAGES OF DROPSHIPPING ONLINE

Unlike traditional retailers, online dropshippers do not need to invest in an initial inventory stockpile.



OVER 1 TRILLION

Ecommerce sale in 2012

CHEAP TO START



LOW COSTS

No overhead expenses such as warehouse fees and inventory management.



LESS RISK

Low initial investment, and no risk from excess inventory



MORE AUTOMATION

33%

Shipping and packaging are handled by manufacturers.

Of Amazon products sold are dropshipped



FLEXIBILITY

Your physical location can be anywhere with an internet connection.

60%

Of all online merchants use dropshipping



SCALABILITY

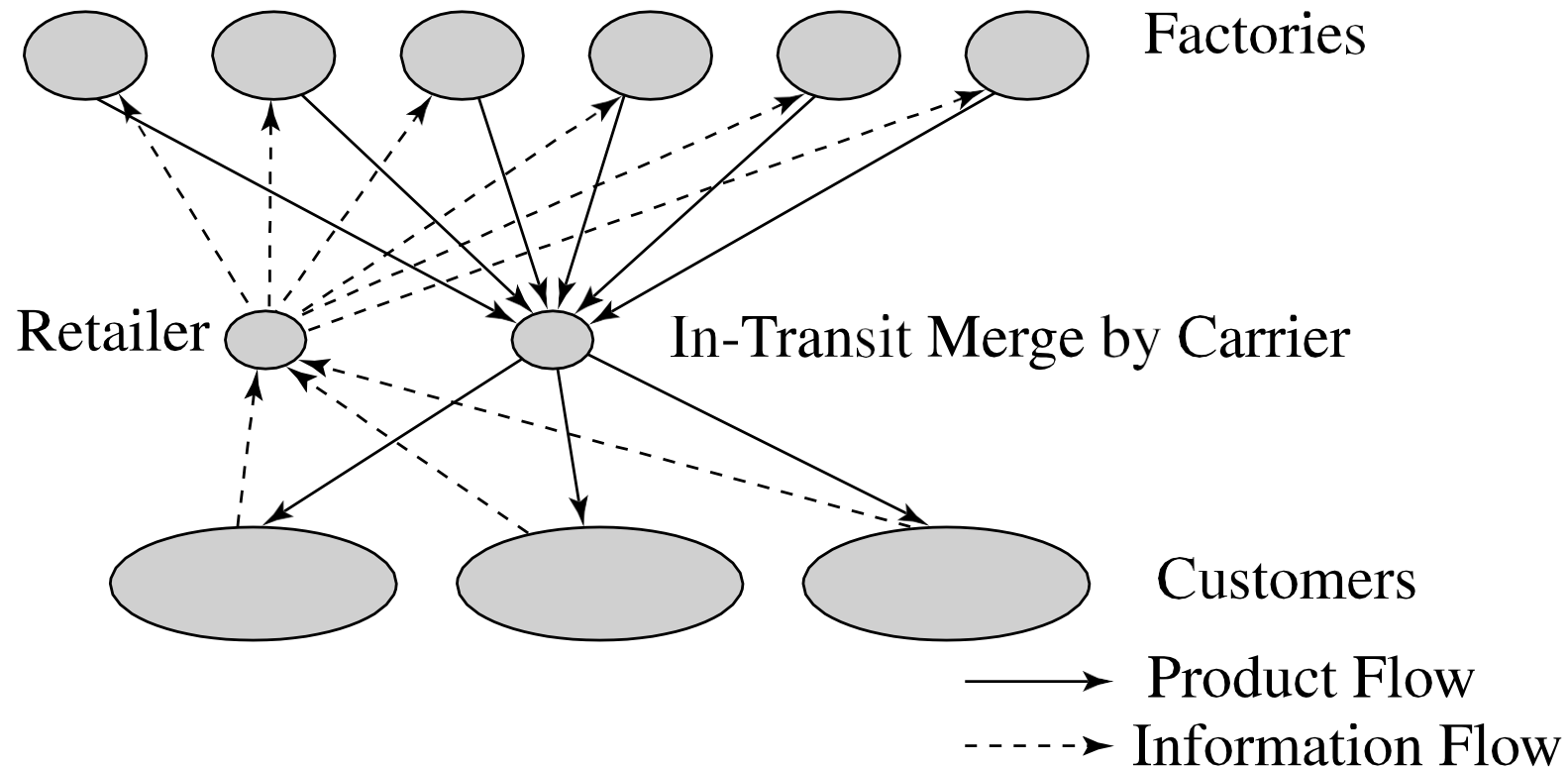
The manufacturer handles the additional workload of increased sales

Sources:
<http://www.emarketer.com/Article/Ecommerce-Sales-Topped-1-Trillion-First-Time-2012/1009649>
<http://www.e-dss.org/drop-shiping>

BAYCITY
BROKERS

WWW.BAYCITYBROKERS.COM

Figure 4-7 In-Transit Merge Network



In-Transit Merge (1 of 2)

Table 4-2 Performance Characteristics of In-Transit Merge

Cost Factor	Performance
Inventory	Similar to drop-shipping.
Transportation	Somewhat lower transportation costs than drop-shipping.
Facilities and handling	Handling costs higher than drop-shipping at carrier; receiving costs lower at customer.
Information	Investment is somewhat higher than for drop-shipping.

In-Transit Merge (2 of 2)

Table 4-2 [Continued]

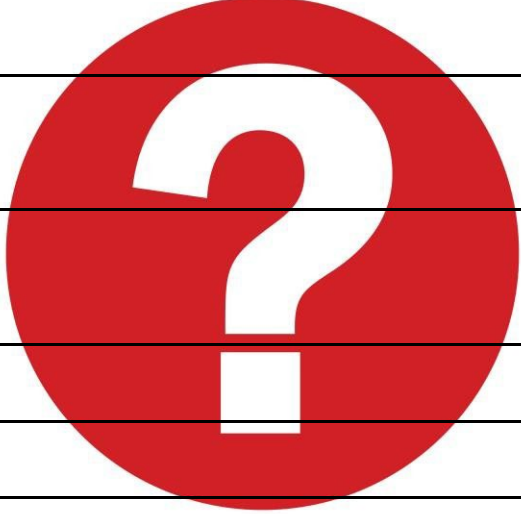
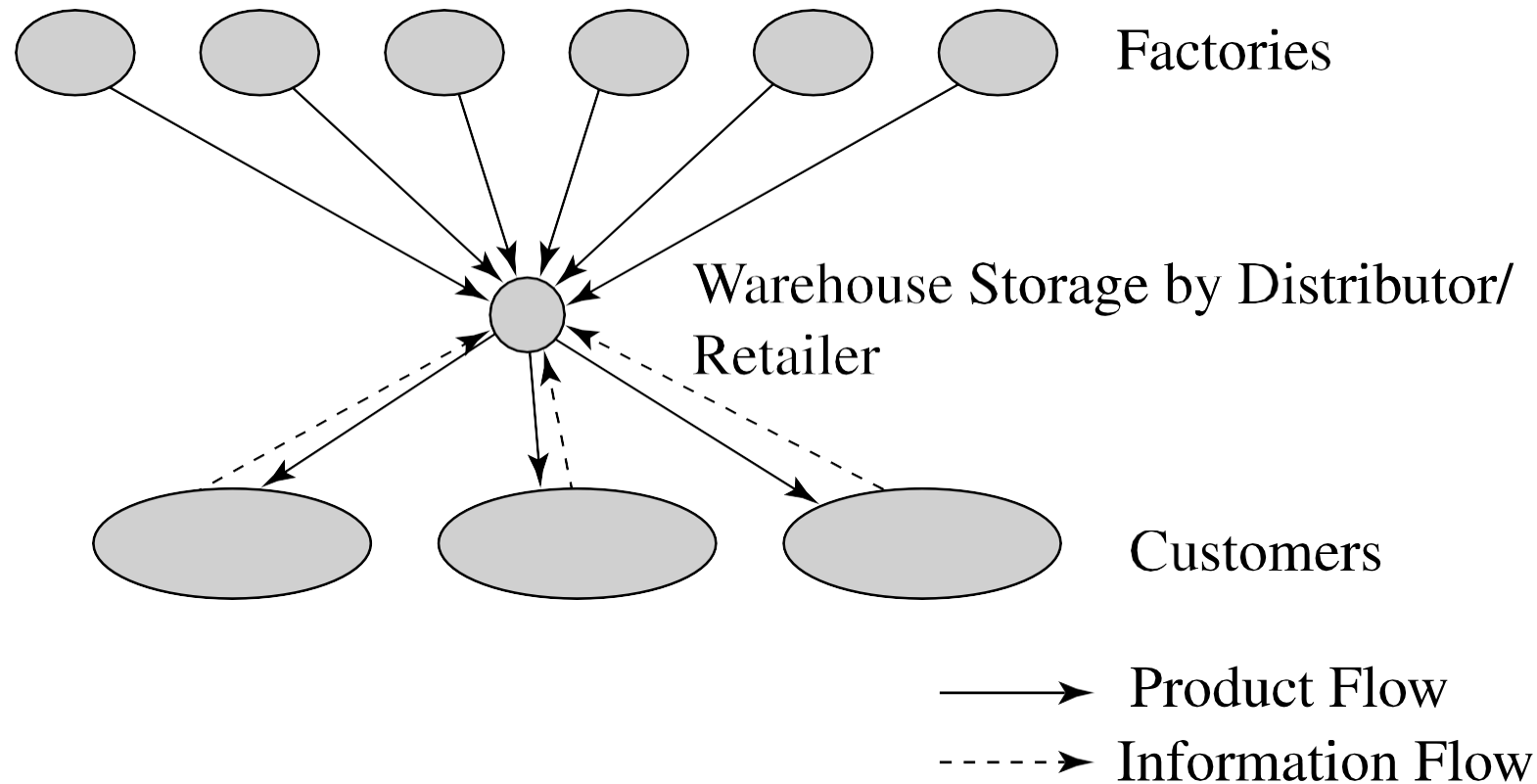
Service Factor	Performance compared to drop-shipping
Response time	
Product variety	
Product availability	
Customer experience	
Time to market	
Order visibility	
Returnability	

Figure 4-8 Distributor Storage with Carrier Delivery



Distributor Storage with Carrier Delivery (1 of 2)

Table 4-3 Performance Characteristics of Distributor Storage with Carrier Delivery

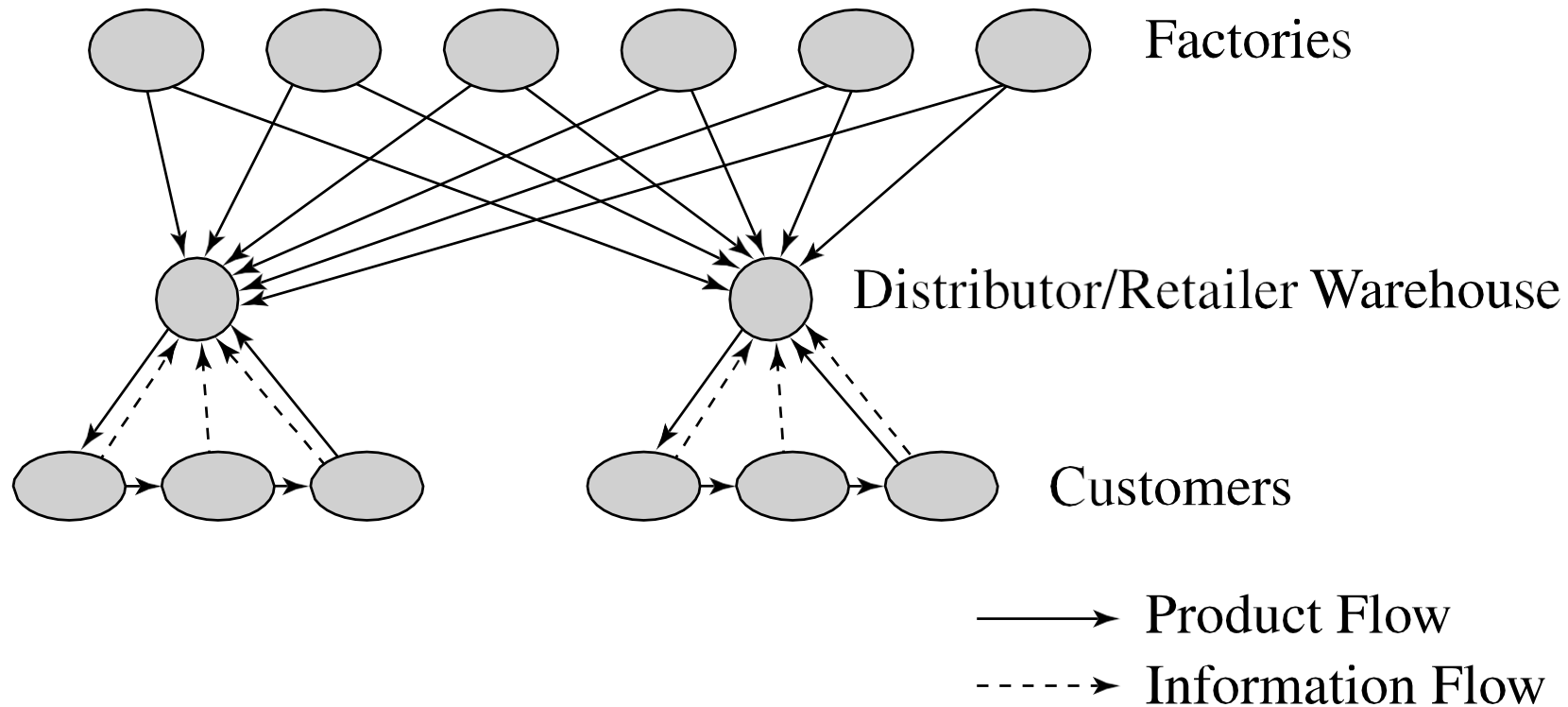
Cost Factor	Performance
Inventory	Higher than manufacturer storage. Difference is not large for faster-moving items but can be large for very slow-moving items.
Transportation	Lower than manufacturer storage. Reduction is highest for faster-moving items.
Facilities and handling	Somewhat higher than manufacturer storage. The difference can be large for very-slow-moving items.
Information	Simpler infrastructure compared to manufacturer storage.

Distributor Storage with Carrier Delivery (2 of 2)

Table 4-3 [Continued]

Service Factor	Performance
Response time	Faster than manufacturer storage.
Product variety	Lower than manufacturer storage.
Product availability	Higher cost to provide the same level of availability as manufacturer storage.
Customer experience	Better than manufacturer storage with drop-shipping.
Time to market	Higher than manufacturer storage.
Order visibility	Easier than manufacturer storage.
Returnability	Easier than manufacturer storage.

Figure 4-9 Distributor Storage with Last Mile Delivery



Distributor Storage with Last Mile Delivery (1 of 2)

Table 4-4 Performance Characteristics of Distributor Storage with Last-Mile Delivery

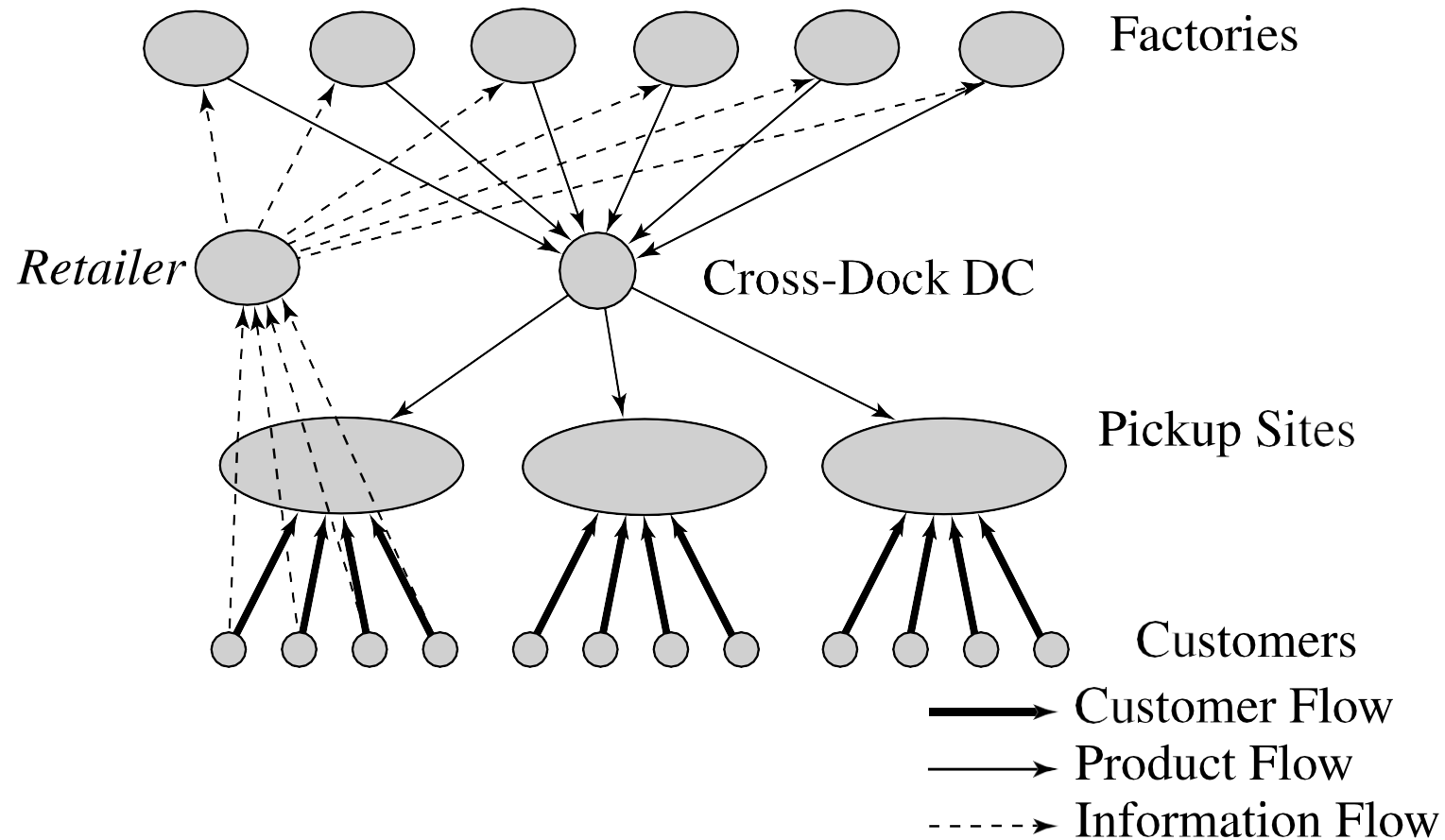
Cost Factor	Performance
Inventory	Higher than distributor storage with package carrier delivery.
Transportation	Very high cost given minimal scale economies. Higher than any other distribution option.
Facilities and handling	Facility costs higher than manufacturer storage or distributor storage with package carrier delivery, but lower than a chain of retail stores.
Information	Similar to distributor storage with package carrier delivery.

Distributor Storage with Last Mile Delivery (2 of 2)

Table 4-4 [Continued]

Service Factor	Performance
Response time	Very quick. Same day to next-day delivery.
Product variety	Somewhat less than distributor storage with package carrier delivery but larger than retail stores.
Product availability	More expensive to provide availability than any other option except retail stores.
Customer experience	Very good, particularly for bulky items.
Time to market	Slightly longer than distributor storage with package carrier delivery.
Order visibility	Less of an issue and easier to implement than manufacturer storage or distributor storage with package carrier delivery.
Returnability	Easier to implement than other previous options. Harder and more expensive than a retail network.

Figure 4-10 Manufacturer or Distributor Storage with Customer Pickup



Manufacturer or Distributor Storage with Customer Pickup (1 of 2)

Table 4-5 Performance Characteristics of Network with Customer Pickup Sites

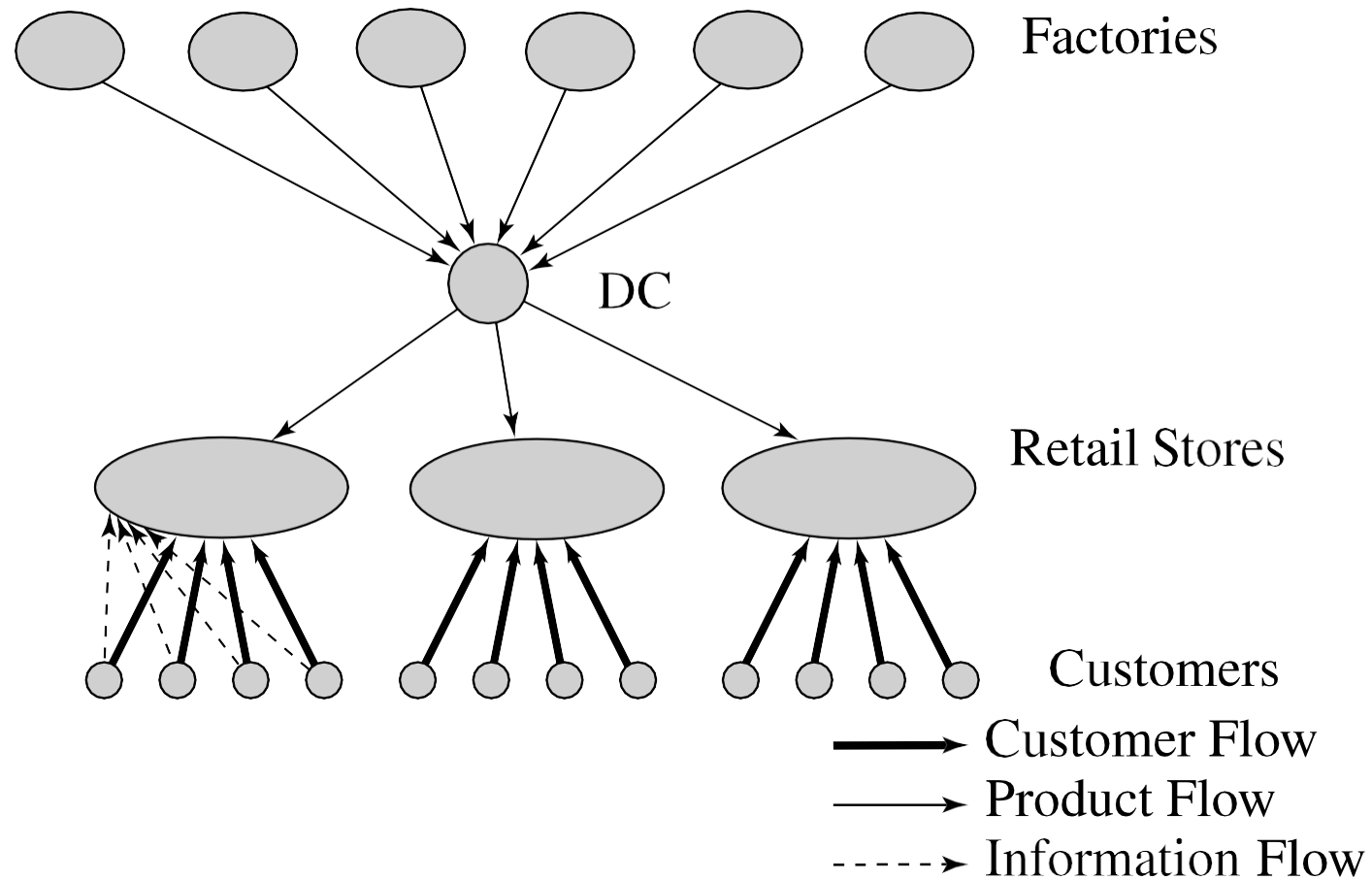
Cost Factor	Performance
Inventory	Can match any other option, depending on the location of inventory.
Transportation	Lower than the use of package carriers, especially if using an existing delivery network.
Facilities and handling	Facility costs can be high if new facilities have to be built. Costs are lower if existing facilities are used. The increase in handling cost at the pickup site can be significant.
Information	Significant investment in infrastructure required.

Manufacturer or Distributor Storage with Customer Pickup (2 of 2)

Table 4-5 [Continued]

Service Factor	Performance
Response time	Similar to package carrier delivery with manufacturer or distributor storage. Same-day pickup is possible for items stored at regional DC.
Product variety	Similar to other manufacturer or distributor storage options.
Product availability	Similar to other manufacturer or distributor storage options.
Customer experience	Lower than other options because of the lack of home delivery. Experience is sensitive to capability of pickup location.
Time to market	Similar to manufacturer or distributor storage options.
Order visibility	Difficult but essential.
Returnability	Somewhat easier, given that pickup location can handle returns.

Figure 4-11 Retail Storage with Customer Pickup



Retail Storage with Customer Pickup (1 of 2)

Table 4-6 Performance Characteristics of Retail Storage with Customer Pickup Sites

Cost Factor	Performance
Inventory	Higher than all other options.
Transportation	Lower than all other options.
Facilities and handling	Higher than other options. The increase in handling cost at the pickup site can be significant for online and phone orders.
Information	Some investment in infrastructure required for online and phone orders.

Retail Storage with Customer Pickup (2 of 2)

Table 4-6 [Continued]

Service Factor	Performance
Response time	Same-day (immediate) pickup possible for items stored locally at pickup site.
Product variety	Lower than all other options.
Product availability	More expensive to provide than all other options.
Customer experience	Related to whether shopping is viewed as a positive or negative experience by customer.
Time to market	Highest among distribution options.
Order visibility	Trivial for in-store orders. Difficult, but essential, for online and phone orders.
Returnability	Easier than other options because retail store can provide a substitute.



<https://oneeducatorsopinion.wordpress.com/2014/02/26/brain-breaks-are-good-for-teachers-too/>

Comparative Performance of Delivery Network Designs

(1 of 3)

Table 4-7 Comparative Performance Rank of Delivery Network Designs

	Retail Storage with Customer Pickup	Manufacturer Storage with Direct Shipping	Manufacturer Storage with In-Transit Merge	Distributor Storage with Package Carrier Delivery	Distributor Storage with Last-Mile Delivery	Manufacturer/ Distributor Storage with Customer Pickup
Response time	1	4	4	3	2	4
Product variety	4	1	1	2	3	1
Product availability	4	1	1	2	3	1

Key: 1 corresponds to the best performance and 6 the worst performance.

Comparative Performance of Delivery Network Designs (2 of 3)

Table 4-7 [Continued]

	Retail Storage with Customer Pickup	Manufacturer Storage with Direct Shipping	Manufacturer Storage with In-Transit Merge	Distributor Storage with Package Carrier Delivery	Distributor Storage with Last-Mile Delivery	Manufacturer / Distributor Storage with Customer Pickup
Customer experience	Varies From 1 to 5	4	3	2	1	5
Time to market	4	1	1	2	3	1
Order visibility	1	5	4	3	2	6
Returnability	1	5	5	4	3	2

Key: 1 corresponds to the best performance and 6 the worst performance.

Comparative Performance of Delivery Network Designs (3 of 3)

Table 4-7 [Continued]

	Retail Storage with Customer Pickup	Manufacturer Storage with Direct Shipping	Manufacturer Storage with In-Transit Merge	Distributor Storage with Package Carrier Delivery	Distributor Storage with Last-Mile Delivery	Manufacturer/ Distributor Storage with Customer Pickup
Inventory	4	1	1	2	3	1
Transportation	1	4	3	2	5	1
Facility and handling	6	1	2	3	4	5
Information	1	4	4	3	2	5

Key: 1 corresponds to the best performance and 6 the worst performance.

Delivery Networks for Different Product/ Customer Characteristics (1 of 2)

Table 4-8 Performance of Delivery Networks for Different Product/Customer Characteristics

	Retail Storage with Customer Pickup	Manufacture r Storage with Direct Shipping	Manufacture r Storage with In-Transit Merge	Distributor Storage with Package Carrier Delivery	Distributor Storage with Last-Mile Delivery	Manufacturer / Distributor Storage with Customer Pickup
High-demand product	+2	−2	−1	0	+1	−1
Medium- demand product	+1	−1	0	+1	0	0
Low-demand Product	−1	+1	0	+1	−1	+1

Delivery Networks for Different Product/ Customer Characteristics (2 of 2)

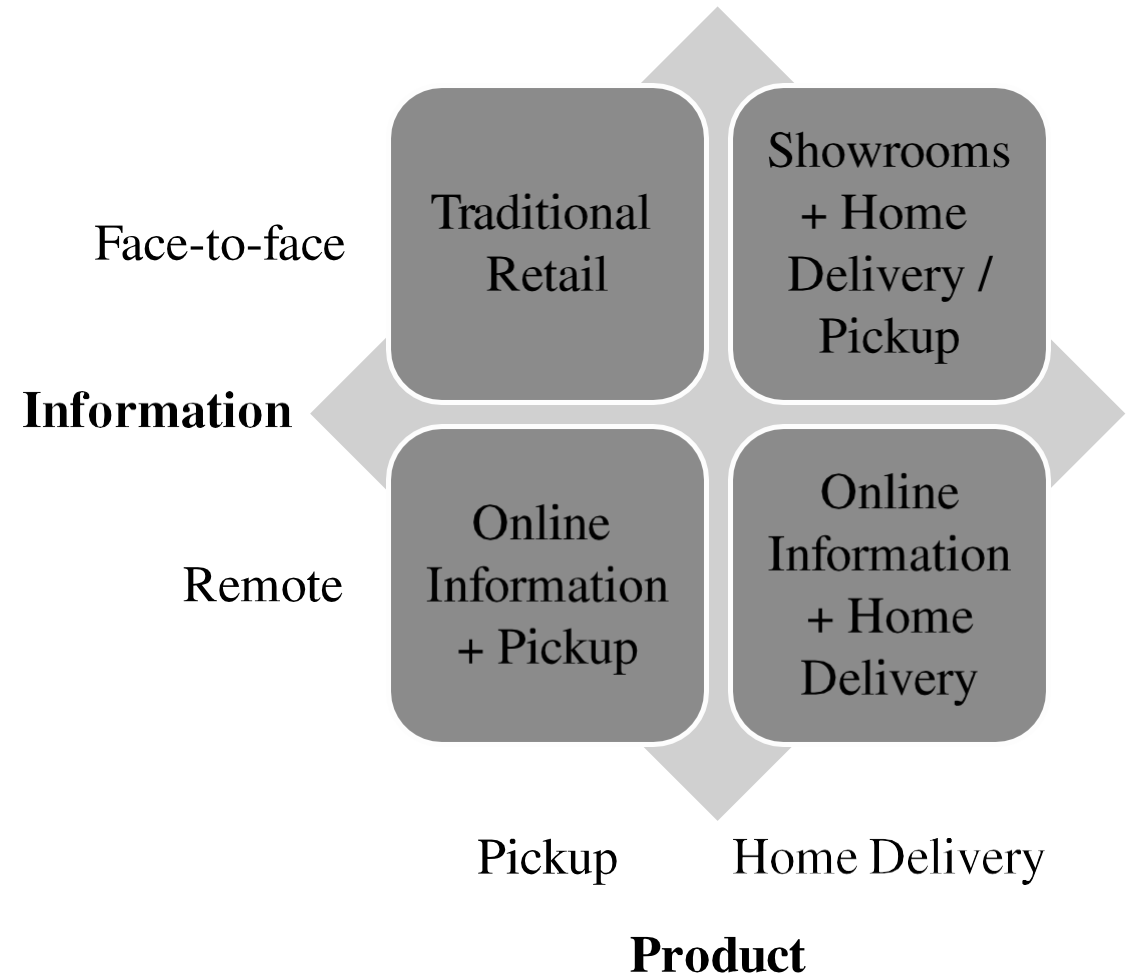
Table 4-8 [Continued]

	Retail Storage with Customer Pickup	Manufacturer Storage with Direct Shipping	Manufacture r Storage with In-Transit Merge	Distributor Storage with Package Carrier Delivery	Distributor Storage with Last-Mile Delivery	Manufacturer / Distributor Storage with Customer Pickup
Very-low-demand product	-2	+2	+1	0	-2	+1
High product value	-1	+2	+1	+1	0	+2
Quick desired response	+2	-2	-2	-1	+1	-2
High product variety	-1	+2	0	+1	0	+2
Low customer effort	-2	+1	+2	+2	+2	-1

Key: +2 = very suitable; +1 = somewhat suitable; 0 = neutral; -1 = somewhat unsuitable; -2 = very unsuitable.

Online Sales and Omni-Channel Retailing

- Omni-channel retailing
 - The use of multiple channels to interact with customers and fulfill their orders
 - Three flows
 - Information
 - Products
 - Funds



Performance of Channels (1 of 3)

- Response time to customers
 - Picking up physical products faster than other channels
 - Online channel may be fastest for information goods
- Product variety
 - Easier to offer larger selection remotely
- Product availability
 - Aggregating inventory improves product availability

Performance of Channels (2 of 3)

- Customer experience
 - Channels have complementarity strengths
- Faster time to market
 - Online/showrooms are quicker than retailing
- Order Visibility
 - Critical for showrooms or online
 - Automatic in retail

Performance of Channels (3 of 3)

- Returnability
 - Easier with physical locations
 - Proportion of returns likely to be higher when information exchange is remote
- Direct Sales to Customers
 - Manufacturers can use remote information exchange for direct access to customers
- Efficient Funds Transfer
 - Internet and smartphones

Performance of Channels in Terms of Cost

- Inventory
 - Lower inventory levels if customers will wait
 - Postpone variety until after the customer order is received
- Facilities
 - Costs related to the physical facilities in a network
 - Costs associated with the operations in these facilities
- Transportation
 - Lower cost of “transporting” information goods in digital form
 - For nondigital, aggregating inventories increases outbound transportation
- Information
 - Investment higher for channels that provide information remotely

Relative Costs for Omni-Channel Alternatives

Table 4-9 Relative Costs for Omni-Channel Alternatives

	Traditional Retail	Showrooms + Home Delivery	Online Information + Home Delivery	Online Information + Pickup
Inventory	High	Low - Medium	Low	Low - Medium
Facilities	High	Medium	Low	Low - Medium
Transportation by retailer	Low	High	High	Medium
Transportation by customer	High	High	Low	Medium
Information	Low	High	High	High

Framework for Omni-Channel Retailing

(1 of 4)

- Product characteristics and customer needs influence choice of channel
- Product dimensions
 - Demand uncertainty
 - Value
 - Information complexity
- Customer dimensions
 - Willingness to pay
 - Price conscious/service conscious

Framework for Omni-Channel Retailing

(2 of 4)

Table 4-10 Product Demand Uncertainty and Omni-Channel Retailing

	Predictable Demand Product	Unpredictable Demand Product
Traditional Retail	Compete on price	Compete on service for high information complexity products
Showrooms	Not suitable	Compete on price and variety for high information complexity products
Online Information + Home Delivery	Compete on service	Compete on price and variety
Online Information + Pickup	Compete on ability to provide service at a lower price	More competitive on price than home delivery option

Framework for Omni-Channel Retailing

(3 of 4)

Table 4-11 Product Value and Omni-Channel Retailing

	Low Value Product	High Value Product
Traditional Retail	Compete on price for predictable demand products	Compete on service for products with uncertain demand and high information complexity
Showrooms	Compete on high variety at reasonable price for high information complexity Products	Compete on price for customizable, high information complexity products
Online Information + Home Delivery	Compete on service	Compete on price and variety
Online Information + Pickup	Compete on ability to provide service at a lower price	More competitive on price than home delivery option

Framework for Omni-Channel Retailing

(4 of 4)

Table 4-12 Product Information Complexity and Omni-Channel Retailing

	Low Information Complexity Product	High Information Complexity Product
Traditional Retail	Compete on price for predictable demand products	Compete on service for uncertain demand products
Showrooms	Not suitable	Compete on price for uncertain demand products
Online Information + Home Delivery	Compete on price for uncertain demand products	Compete on service in terms of variety and availability for uncertain demand products
Online Information + Pickup	Compete on price for uncertain demand products	A slightly cheaper option to compete on service in terms of variety and availability for uncertain demand products

In-class breakout

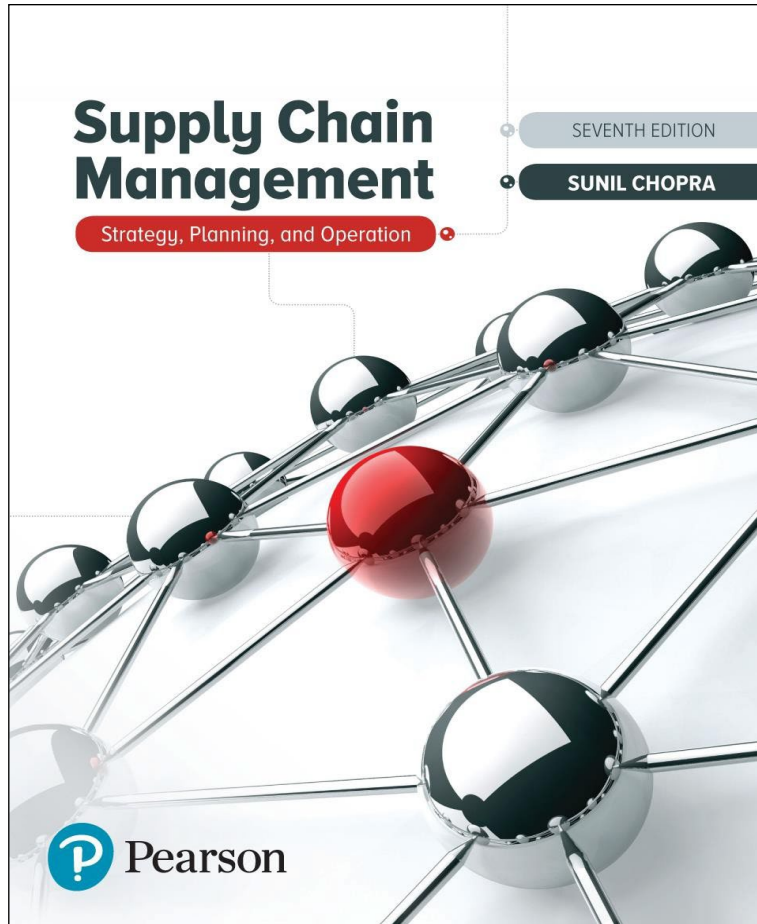
- You have an existing product that will now be customizable (for an extra fee). Marketing estimates that this will increase sales by 50% in the near term and profit per unit (custom only) by 35%. This takes extra materials and 3 minutes to do (labor and small tools only). Your firm currently has an online presence and retail locations. Should the firm:
 - Offer online only
 - Offer in retail stores only
 - Offer both online and retail options
 - Wildcard: Offer through another distribution channel/model (Which one? Why?)
- What are the pros and cons of the approach you chose? (Why or why not)
- Answer Zoom poll



https://e2e.ti.com/blogs_/archives/b/smartgrid/posts/engineering-a-smarter-grid

Supply Chain Management: Strategy, Planning, and Operation

Seventh Edition

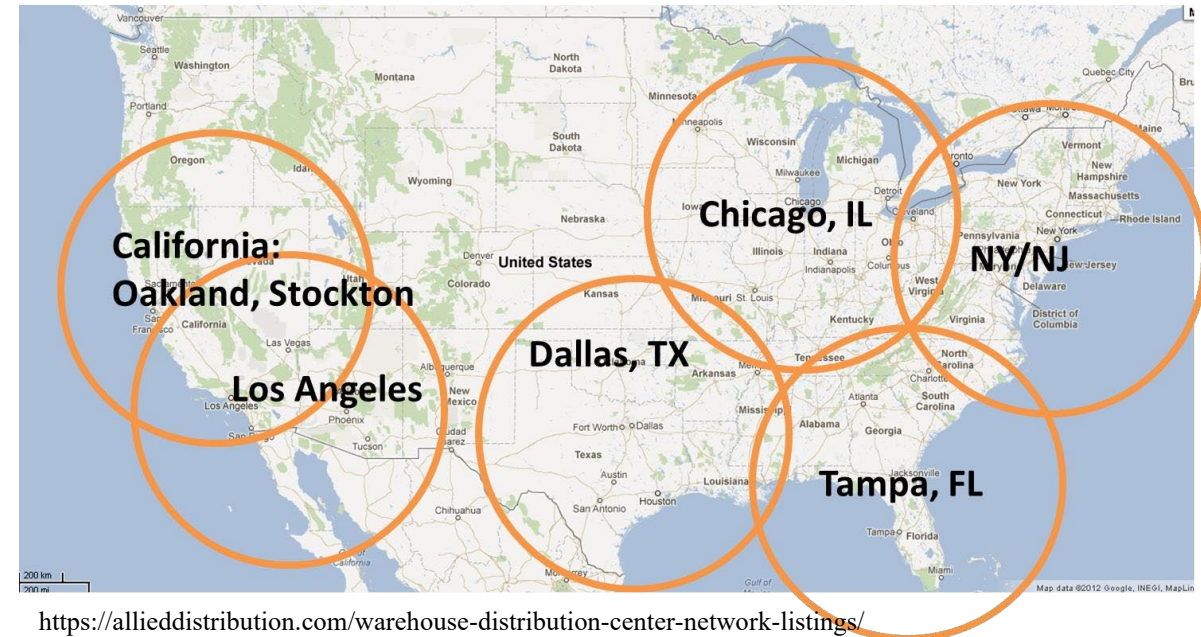


Chapter 5

Network Design in the Supply Chain

The Role of Network Design

- Network design decisions
 - How many manufacturing plants, production lines, distribution centers, cross-docking facilities?
 - Where should facilities be located?
 - How much capacity at each facility?
 - Which products?
 - What markets?
- Revisit design decisions after market changes, mergers, or factor cost changes



<https://allieddistribution.com/warehouse-distribution-center-network-listings/>

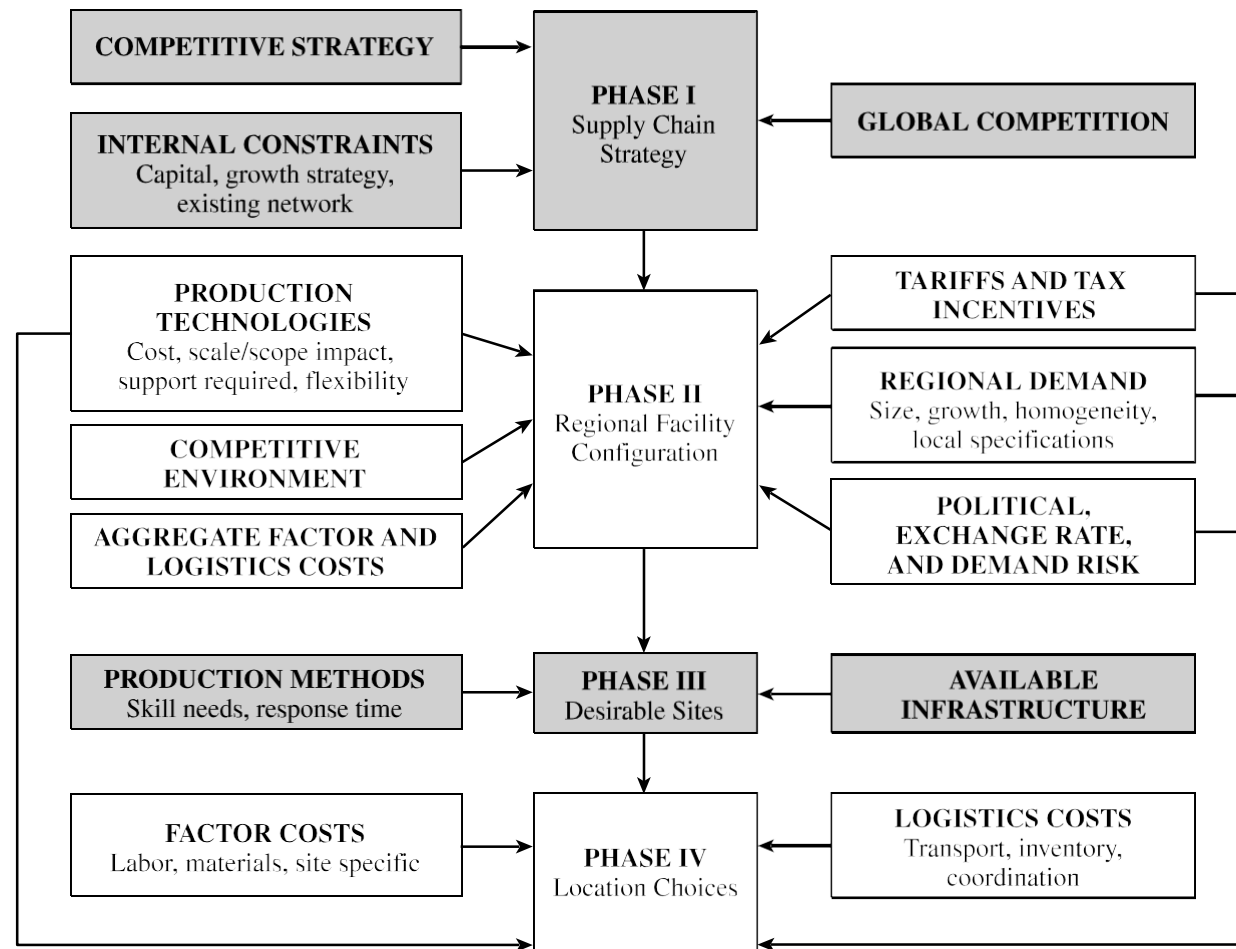
Factors Influencing Network Design Decisions

- Strategic Factors
- Competitive Factors
 - Positive externalities
 - Locating to split the market
- Political Factors
- Infrastructure Factors
- Customer Response Time and Service Level
- Total Logistics Cost
- Macroeconomic Factors
 - Tariffs and tax incentives
 - Exchange-rate and demand risk

Framework for Network Design Decisions

- Maximize the overall profitability of the supply chain network while providing customers with the appropriate responsiveness
- Many trade-offs during network design
- Network design models used
 - to decide on locations and capacities
 - to assign current demand to facilities and identify transportation lanes

Figure 5-2 Framework for Network Design Decisions



Framework for Network Design Decisions

(1 of 3)

- **Phase I: Define a Supply Chain Strategy/Design**
 - Clear definition of the firm's competitive strategy
 - Forecast the likely evolution of global competition
 - Identify constraints on available capital
 - Determine broad supply strategy

Framework for Network Design Decisions

(2 of 3)

- **Phase II: Define the Regional Facility Configuration**
 - Forecast of the demand by country or region
 - Identify fixed and variable costs, economies of scale or scope
 - Identify regional tariffs, requirements for local production, tax incentives, and export or import restrictions
 - Identify competitors
 - Identify demand risk, exchange-rate risk, political risk

Framework for Network Design Decisions

(3 of 3)

- **Phase III: Select a Set of Desirable Potential Sites**
 - Hard infrastructure requirements
 - Soft infrastructure requirements
- **Phase IV: Location Choices and Market Allocation**

Models for Designing a Regional Network Configuration

- Inputs Required By Region
 - Demand
 - Desired response time
 - Fixed cost of opening a facility
 - Variable cost of labor and material
 - Inventory holding cost
 - Transportation cost between pairs of regions
 - Sale price of product
 - Taxes and tariffs
 - Potential facility capacity

Locational Models

- Capacitated Plant Location Model (with or without taxes, tariffs, fill rate objective)
- Identifying Potential Sites – gravity model
- Demand Allocation and Plant Location
- Locating Plants and Warehouses Simultaneously

Lexus case study





Assignments

- Case 4 due next week
 - Write up
 - Recorded presentation due May 11
- Prepare for week 7:
 - Read chapter 14
 - Watch video on chapter 6
 - Take no-point quiz
- Next week
 - Will discuss final exam
 - Have review session
 - If you have ANY questions about homework, please ask! Your understanding of the HW problems are critical for being successful on the final.

Office hours! Please join me on Tuesdays 1-2pm or by appointment!



TEAM MEETING

