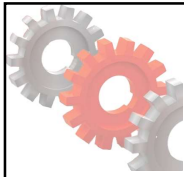


Learning Objectives

1. Identify the key factors to be considered when designing a distribution network
2. Discuss the strengths and weaknesses of various distribution options
3. Understand how online sales have affected the design of distribution networks in different industries

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The Role of Distribution 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 experience
- Choice of distribution network can achieve supply chain objectives from low cost to high responsiveness

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Factors Influencing Distribution Network Design

- Distribution network performance evaluated along two dimensions
 1. Customer needs that are met
 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

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Factors Influencing Distribution Network Design

- Elements of customer service influenced by network structure:
 - Response time
 - Product variety
 - Product availability
 - Customer experience
 - Order visibility
 - Returnability

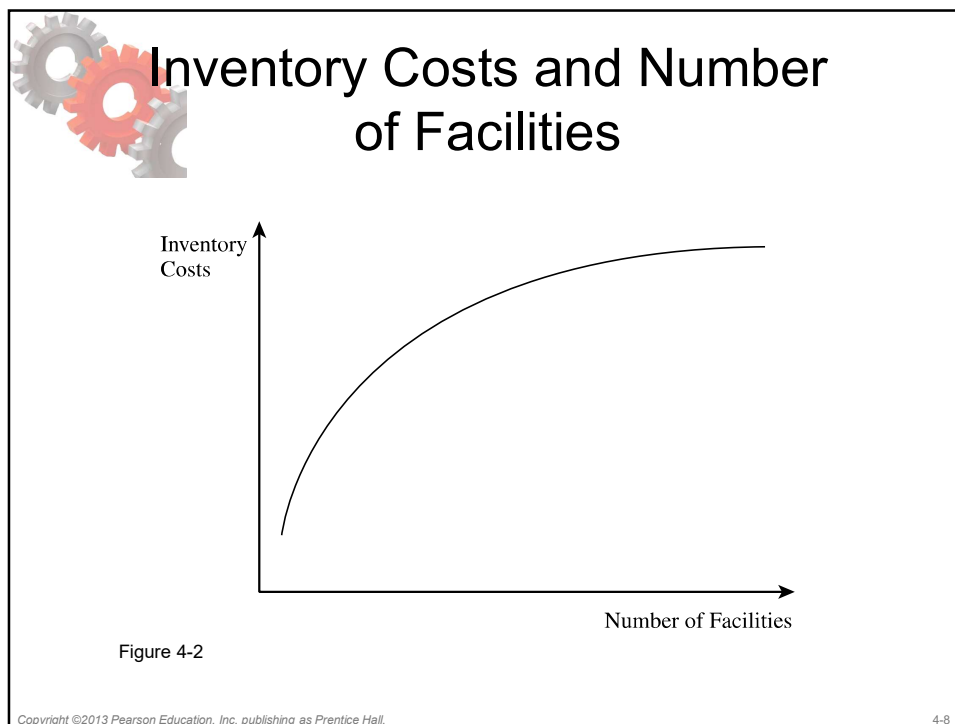
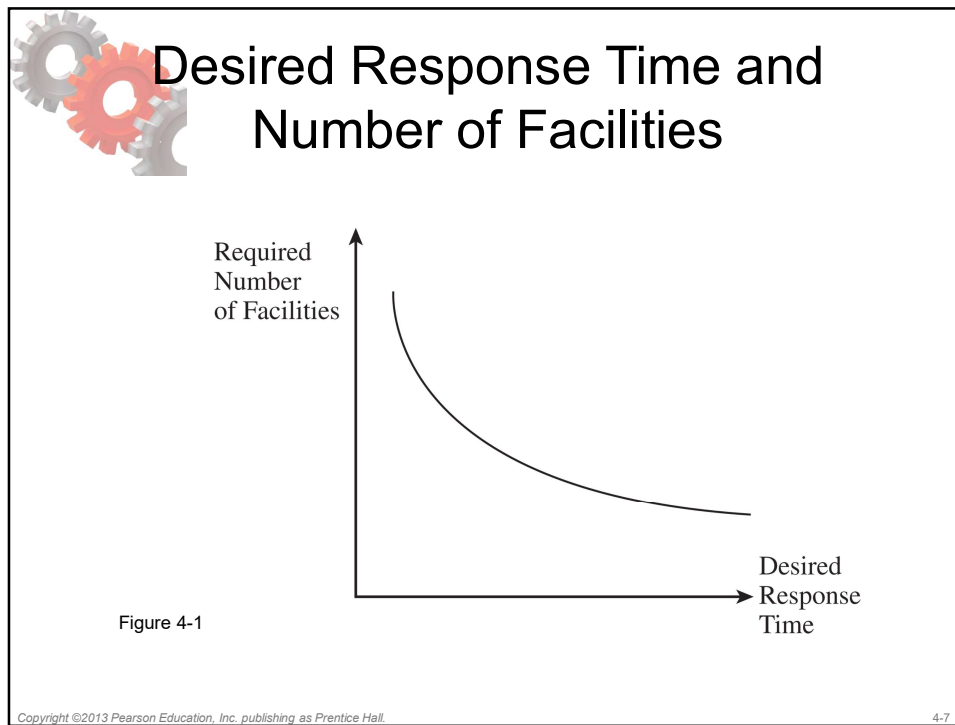
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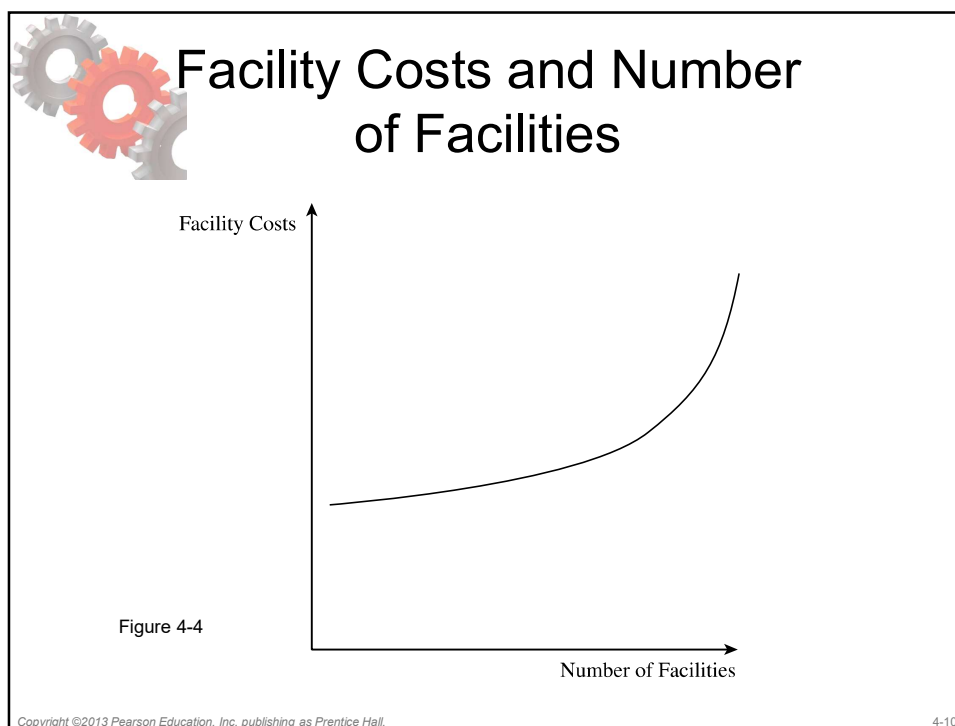
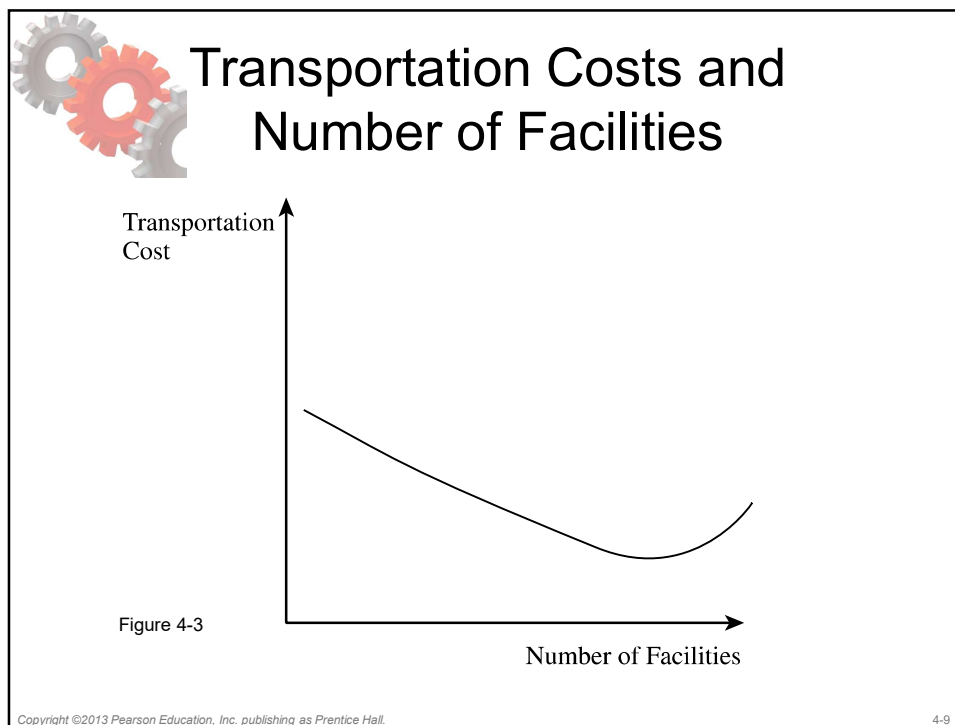



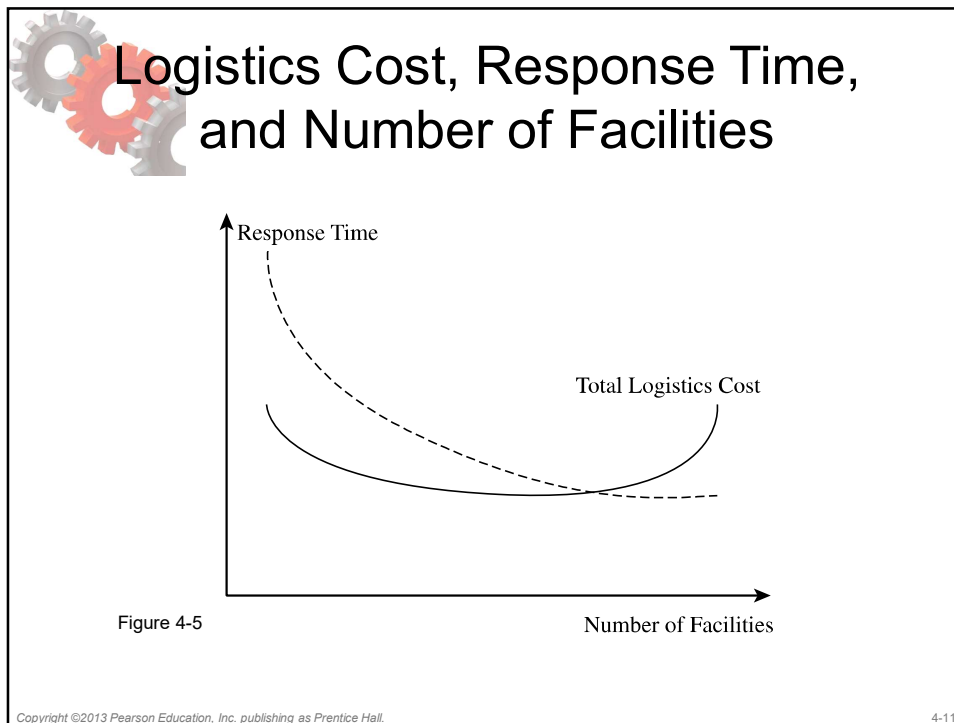
Factors Influencing Distribution Network Design

- Supply chain costs affected by network structure:
 - Inventories
 - Transportation
 - Facilities and handling
 - Information

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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)?

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Design Options for a Distribution Network

- 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

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Manufacturer Storage with Direct Shipping

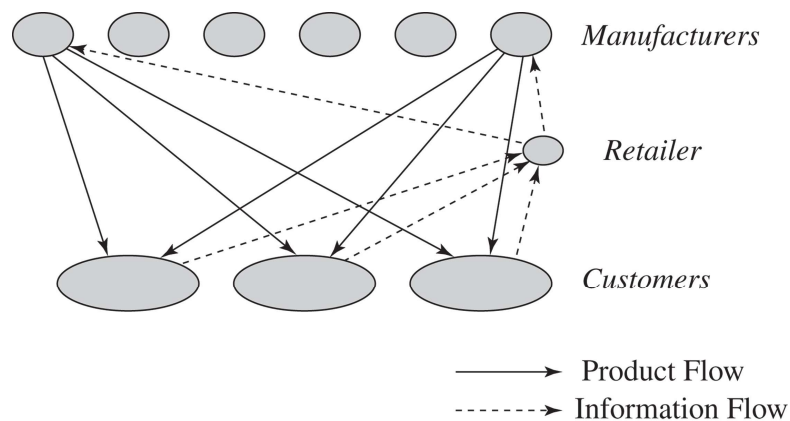



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Manufacturer Storage with Direct Shipping Network

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.

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Manufacturer Storage with Direct Shipping Network

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.

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In-Transit Merge Network

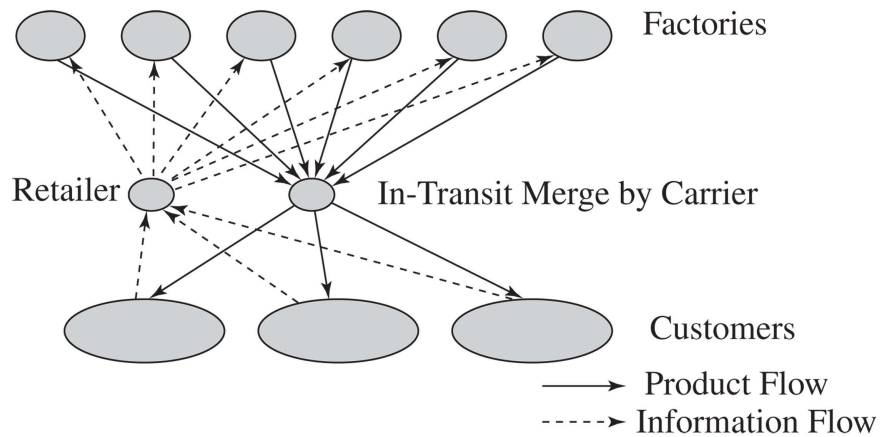


Figure 4-7

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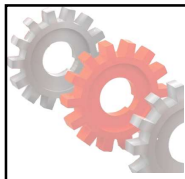
In-Transit Merge

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.

Table 4-2

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In-Transit Merge

Service Factor	Performance
Response time	Similar to drop-shipping; may be marginally higher.
Product variety	Similar to drop-shipping.
Product availability	Similar to drop-shipping.
Customer experience	Better than drop-shipping because only a single delivery has to be received.
Time to market	Similar to drop-shipping.
Order visibility	Similar to drop-shipping.
Returnability	Similar to drop-shipping.

Table 4-2

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Distributor Storage with Carrier Delivery

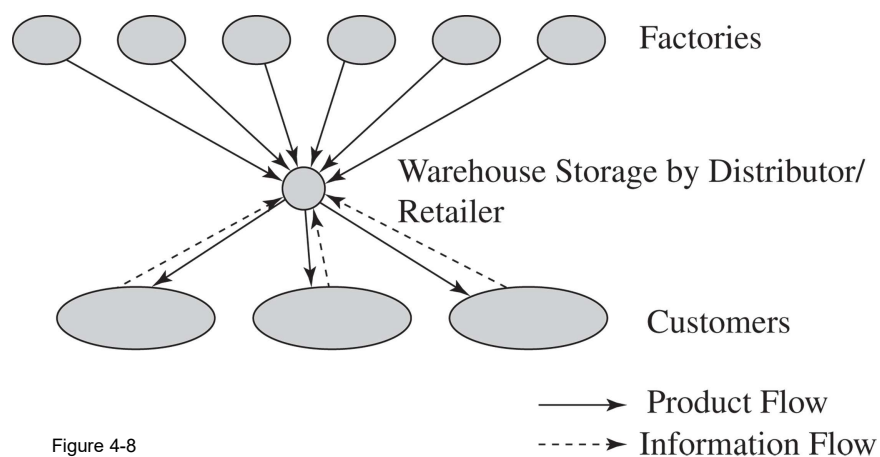
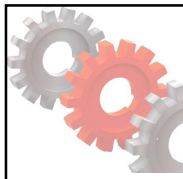


Figure 4-8

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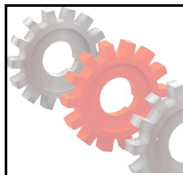
Distributor Storage with Carrier Delivery

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.

Table 4-3

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Distributor Storage with Carrier Delivery

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.

Table 4-3

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Distributor Storage with Last Mile Delivery

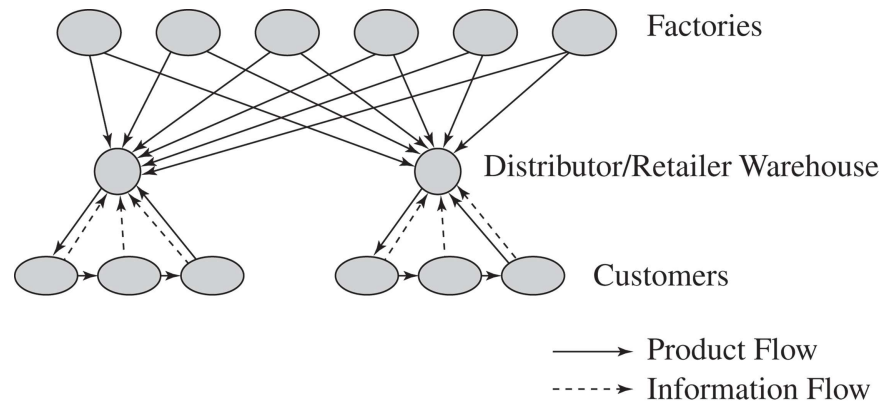


Figure 4-9

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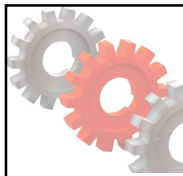
Distributor Storage with Last Mile Delivery

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.

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Distributor Storage with Last Mile Delivery

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. Slightly higher than distributor storage with package carrier delivery.
Time to market	Less of an issue and easier to implement than manufacturer storage or distributor storage with package carrier delivery.
Order visibility	Easier to implement than other previous options.
Returnability	Harder and more expensive than a retail network.

Table 4-4

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Manufacturer or Distributor Storage with Customer Pickup

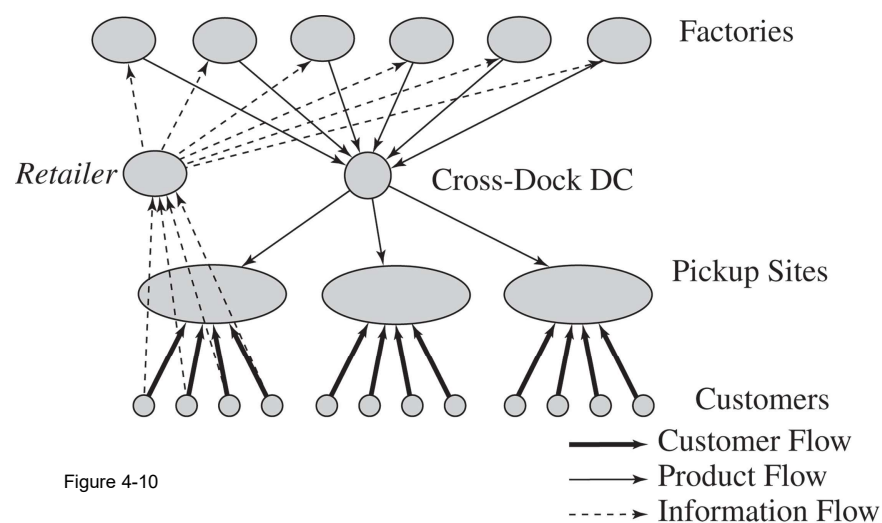



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Manufacturer or Distributor Storage with Customer Pickup

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.

Table 4-5

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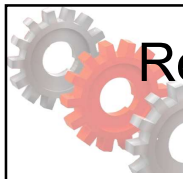


Manufacturer or Distributor Storage with Customer Pickup

Service Factor	Performance
Response time	Similar to package carrier delivery with manufacturer or distributor storage. Same-day delivery possible for items stored locally at pickup site.
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 storage options.
Order visibility	Difficult but essential.
Returnability	Somewhat easier given that pickup location can handle returns.

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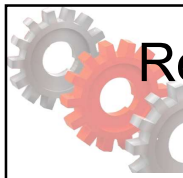
Retail Storage with Customer Pickup

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.

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Retail Storage with Customer Pickup

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.

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Comparative Performance 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 Storage with 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
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
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 strongest performance and 6 the weakest performance.

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Delivery Networks for Different Product/ Customer Characteristics



	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 Storage with 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
Very low-demand product	-2	+2	+1	0	-2	+1
Many product sources	+1	-1	-1	+2	+1	0
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.

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