

# Distribution

Managing fulfillment operations  
EE382



# Learning Objectives

- Discuss the strategic value-adding role distribution plays in the supply chain
- Recognize the tradeoffs between distribution and other supply chain functions
- Understand and analytical framework for distributing planning decisions
- Evaluate fulfillment strategies and distribution methods



# Distribution

- Focuses on the continuous flows of product to fulfill customer requirements at the lowest possible cost



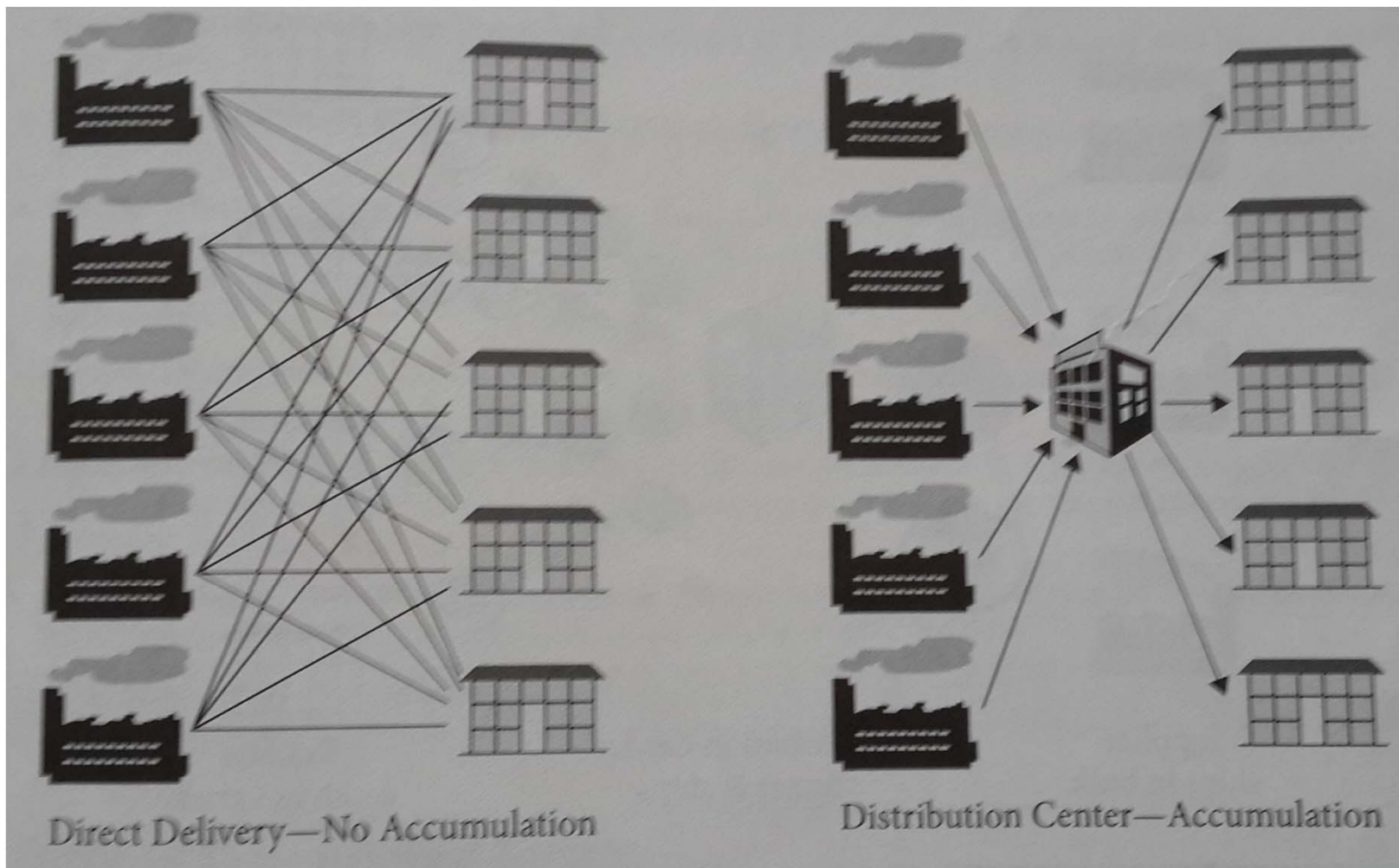
# The role of distribution operations in SCM

- Balancing supply and demand
- Protecting against uncertainty
- Allowing quantity purchase discounts
- Supporting production requirements
- Promoting transportation economies

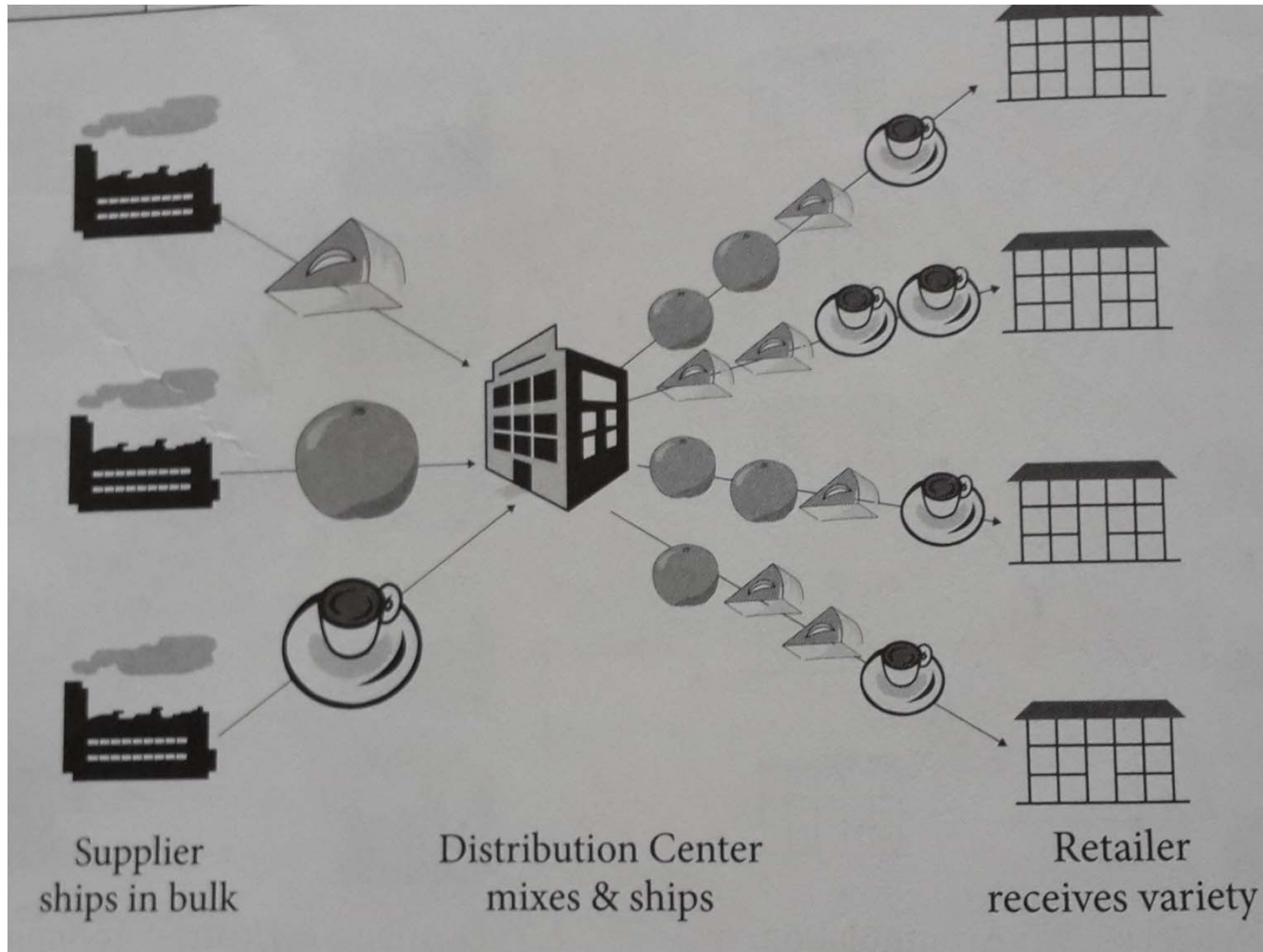
# Distribution facility functionality

- Accumulation
  - Involves the receipt of goods from a variety of sources
- Sortation
  - Focuses on assembling like products together for storage in the distribution facility or for transfer to customers
- Allocation
  - Focuses on matching available inventory to customer orders for a stock-keeping unit
- Assortment
  - Involves the assembly of customer orders for multiple stock-keeping units held in the distribution facility

# The distribution Center's Accumulation Role



# The distribution center's mixing capability

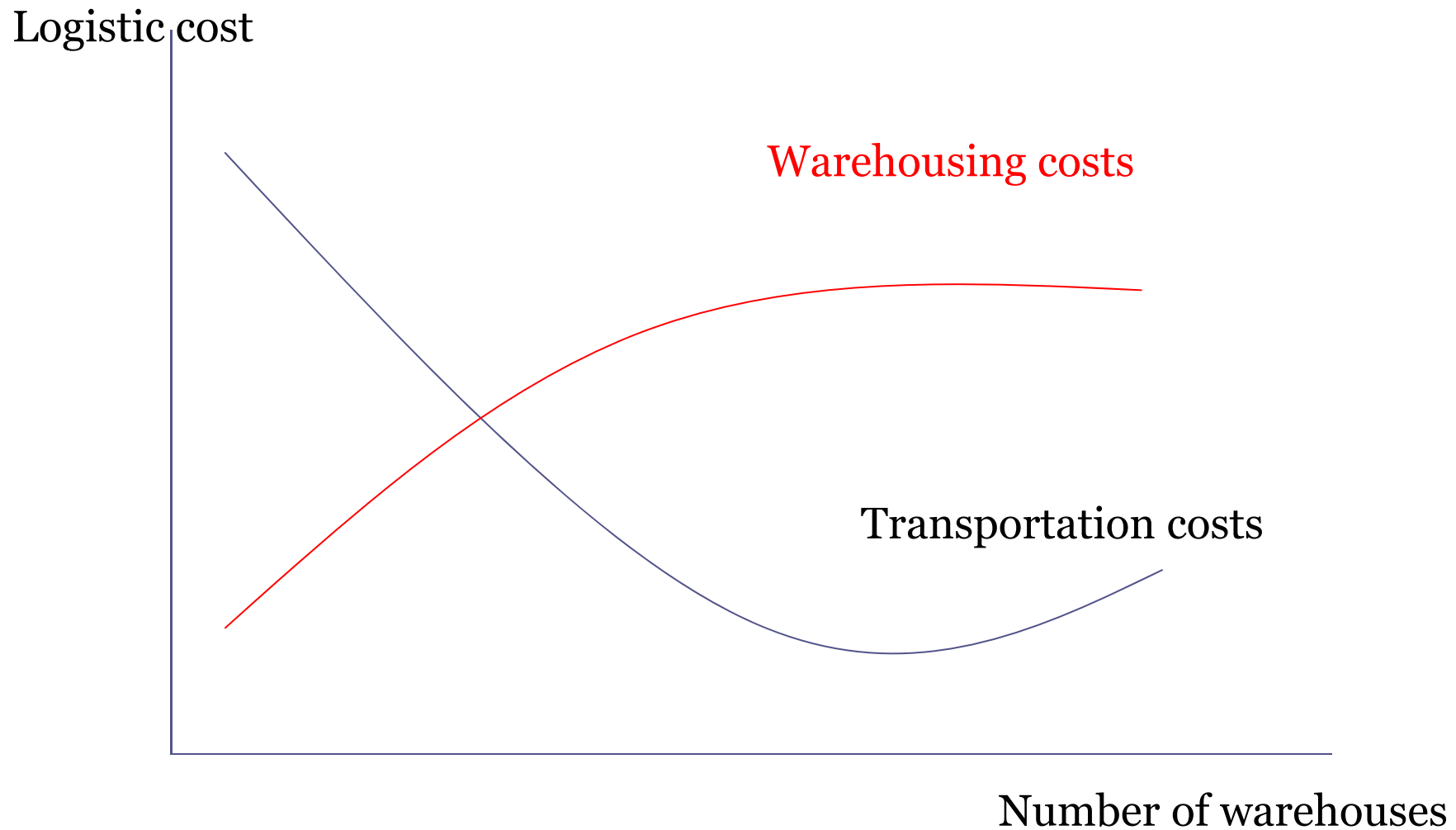





# Distribution Tradeoff

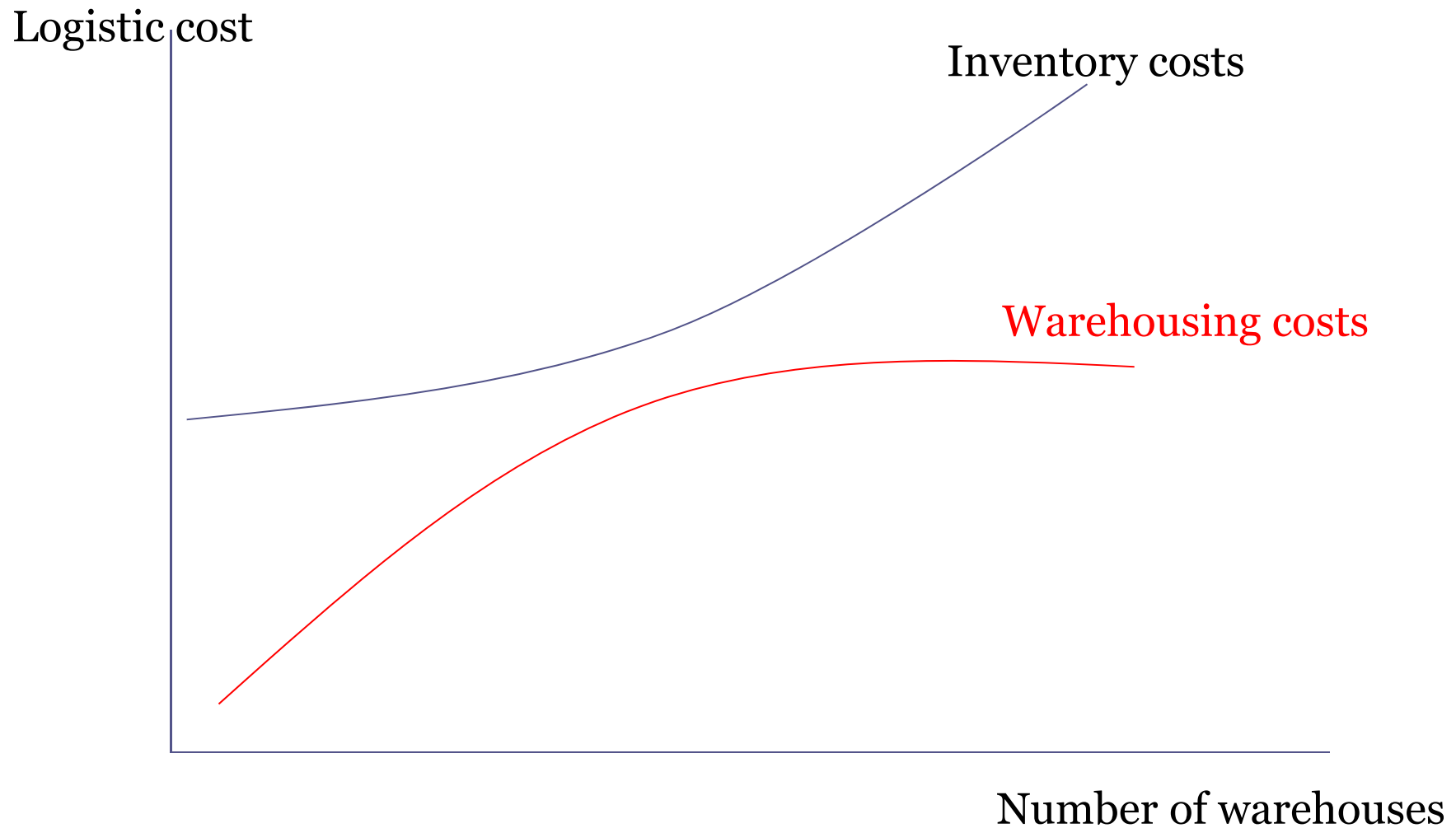
- Tradeoff between distribution and transportation operations
- When a supply chain has no market-facing distribution centers or warehouses, transportation costs will be very high
- Organizations may benefit substantially from the establishment of one or several warehouses to reduce transportation costs

# Warehouse-Transportation tradeoff

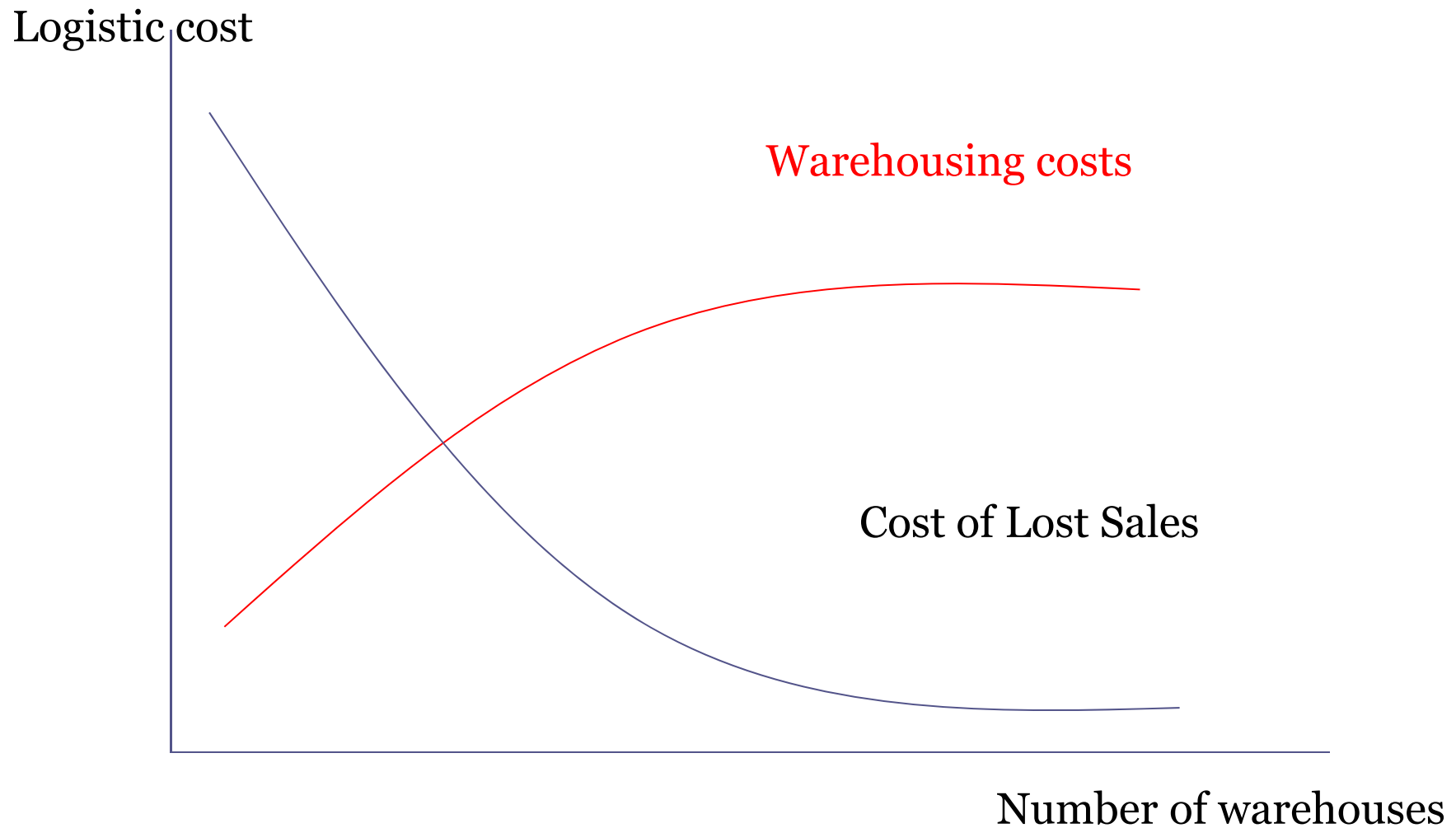



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- Tradeoff between distribution and inventory
  - The more distribution centers and warehouses, the higher the total inventory carrying costs will be
  - As facilities are added to a fulfillment system, the amount of inventory will increase in total, but at a decreasing rate
  - Risk pooling strategy

# Warehouse-inventory tradeoff



# Warehouse-Service tradeoff



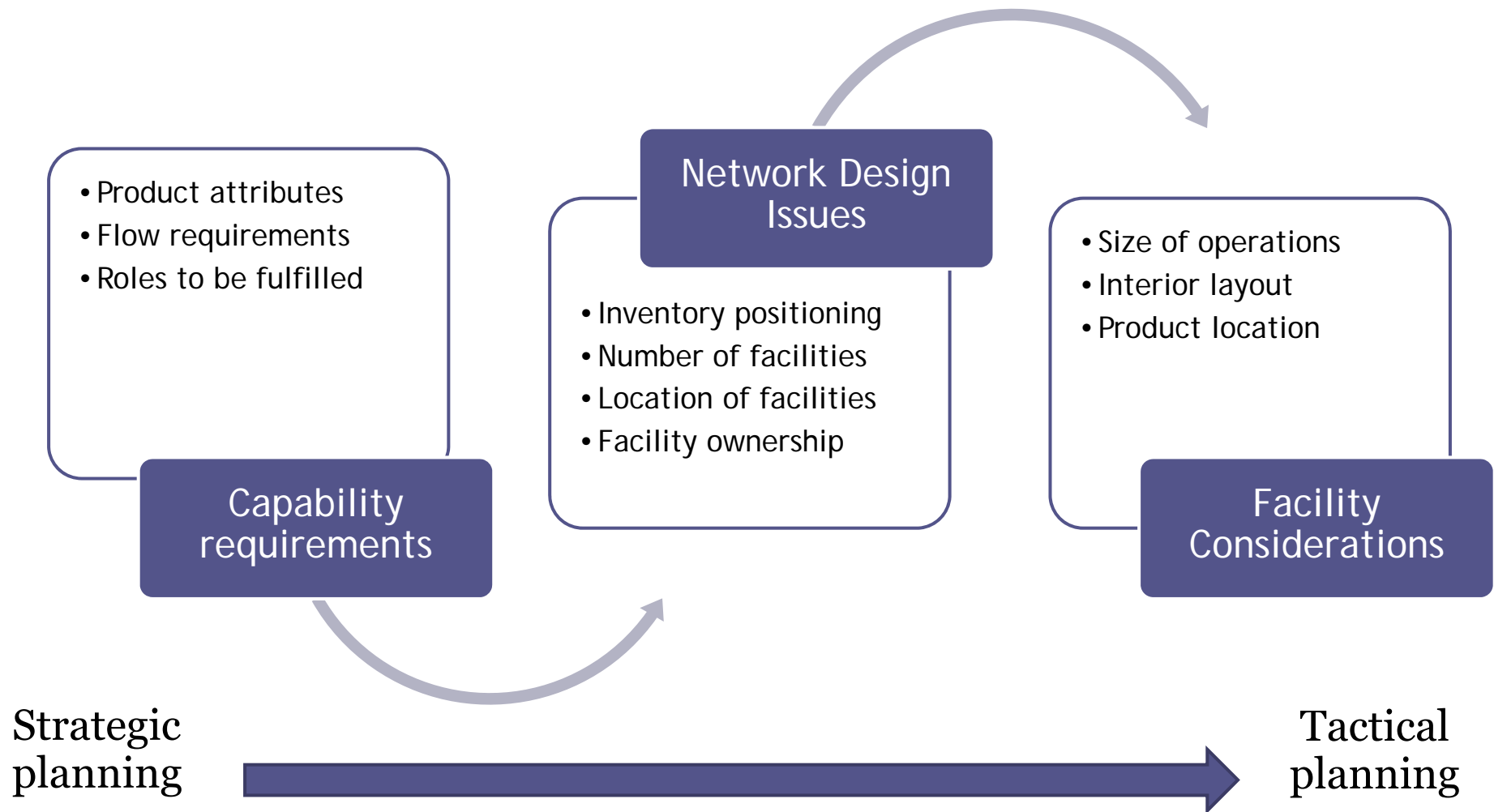
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- For internal efficiency targets to be met, it is necessary to make conscientious financial and performance tradeoffs between resources
  - The primary tradeoffs and relationships include
    - Space vs. equipment
      - The larger the facility and the more space used for distribution operations, the more equipment will be needed in the facility
    - Equipment vs. people
      - The greater the use of equipment to automate materials handling and distribution activity, the lower the labor requirements of a facility
    - People vs. space
      - The larger the facility workforce, the larger the facility size and operation possible. It is difficult for a small team to operate a sizable facility unless there is significant use of materials handling and flow automation



# Distribution Planning and Strategy

- Capability requirements
- Network design issues
- Facility considerations

# Strategic Distribution Decisions

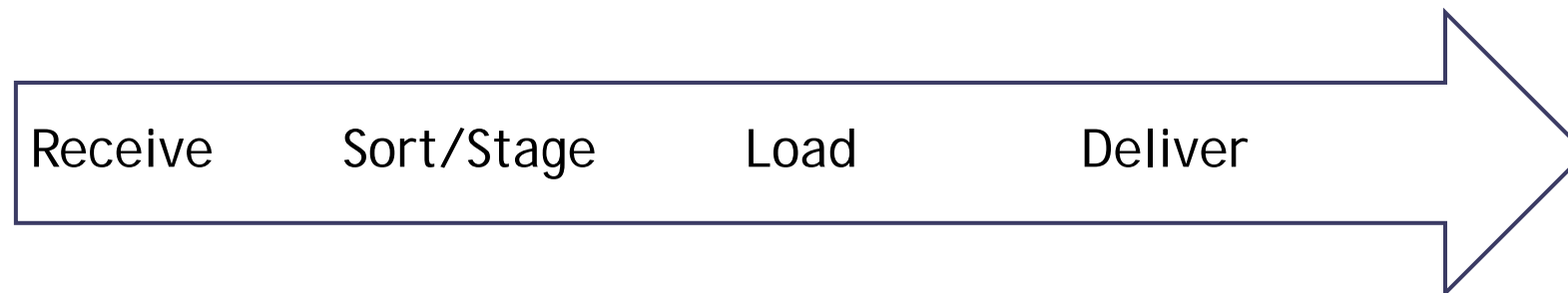


# Capability requirements

- Product characteristics
- Product flow requirements
  - Direct shipment of goods from the manufacturer to retailer or retailer to consumer
  - Movement of goods through distribution facilities to customers
- Supply chain roles to be fulfilled
  - Accumulation, sortation, allocation, and assortment

# Cross-docking process

In cross-docking process operations, goods flow from receiving to shipping with minimal interim sorting, thus eliminating storage and order picking- two costly, time-consuming activities-from the fulfillment process



Basic or low tech option relies **heavily on manual labor**

# Cross-docking process

Advanced or high tech option relies **heavily on automation**

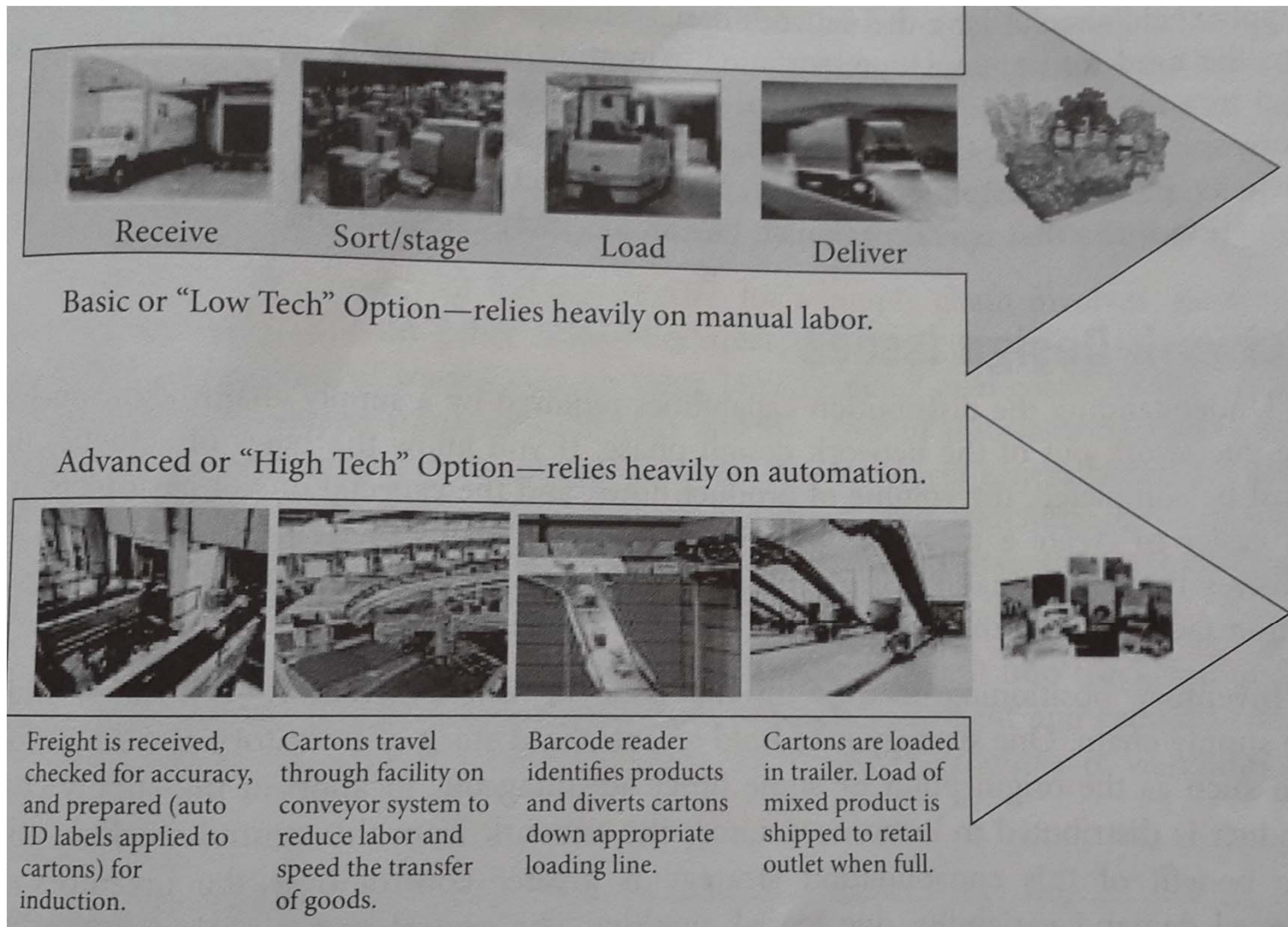
Freight is received for accuracy and prepared for induction

Cartons travel through facility on conveyor system to reduce labor and speed the transfer of goods

Barcode reader identifies products and diverts cartons down appropriate loading line

Cartons are loaded in trailer. Load of mixed product is shipped to retail outlet when full

# Cross-docking process

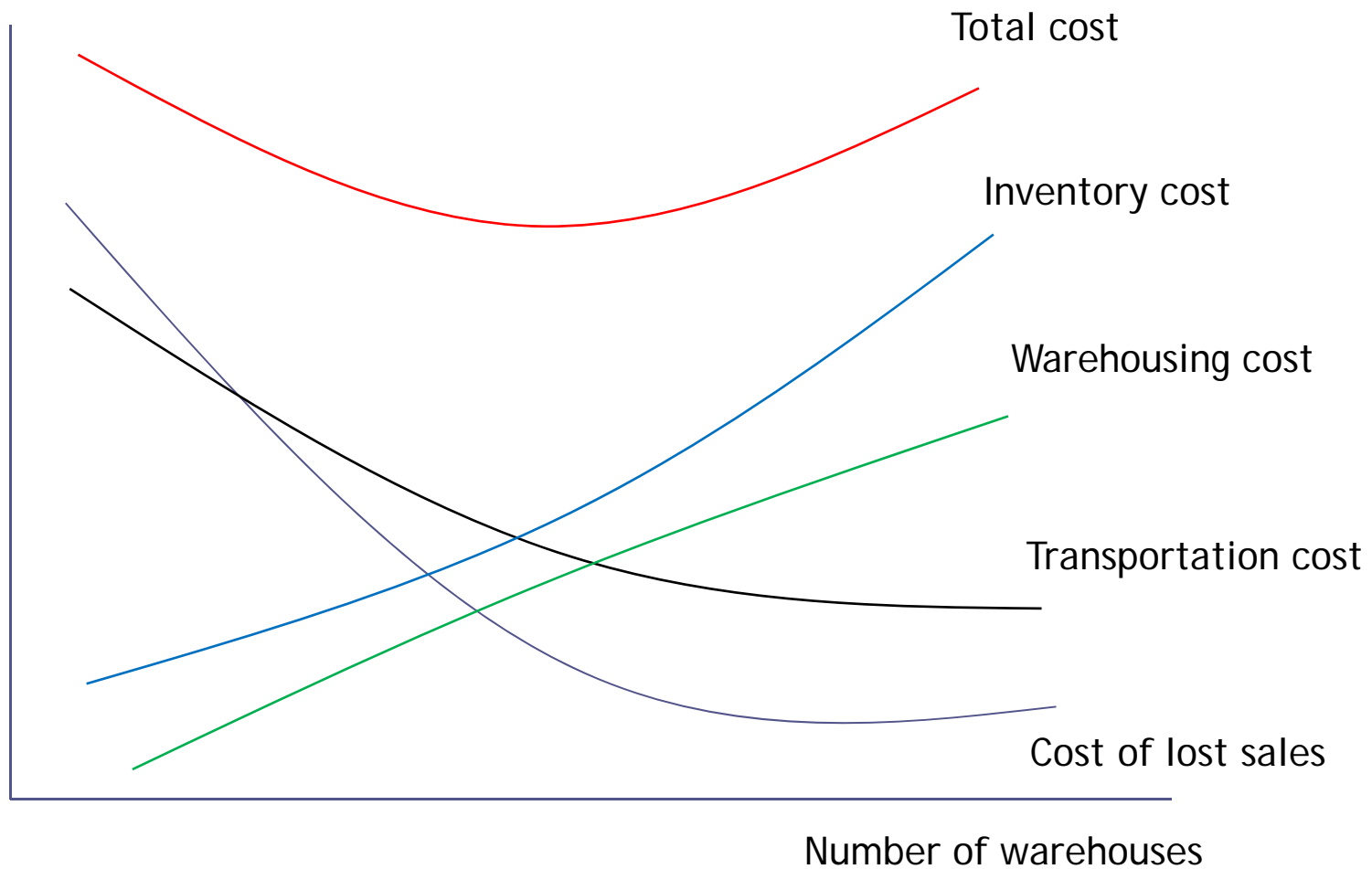



# Network design issues

- Inventory positioning focuses on the issue of where inventory is located within the supply chain
  - Centralized stock of inventory at a single location
  - Decentralized inventory strategy
- Number of facilities
  - The greater the centralization of the inventory, the fewer the number of facilities needed to distribute the product
- Location of facilities
- Facility ownership

# Distribution cost tradeoffs

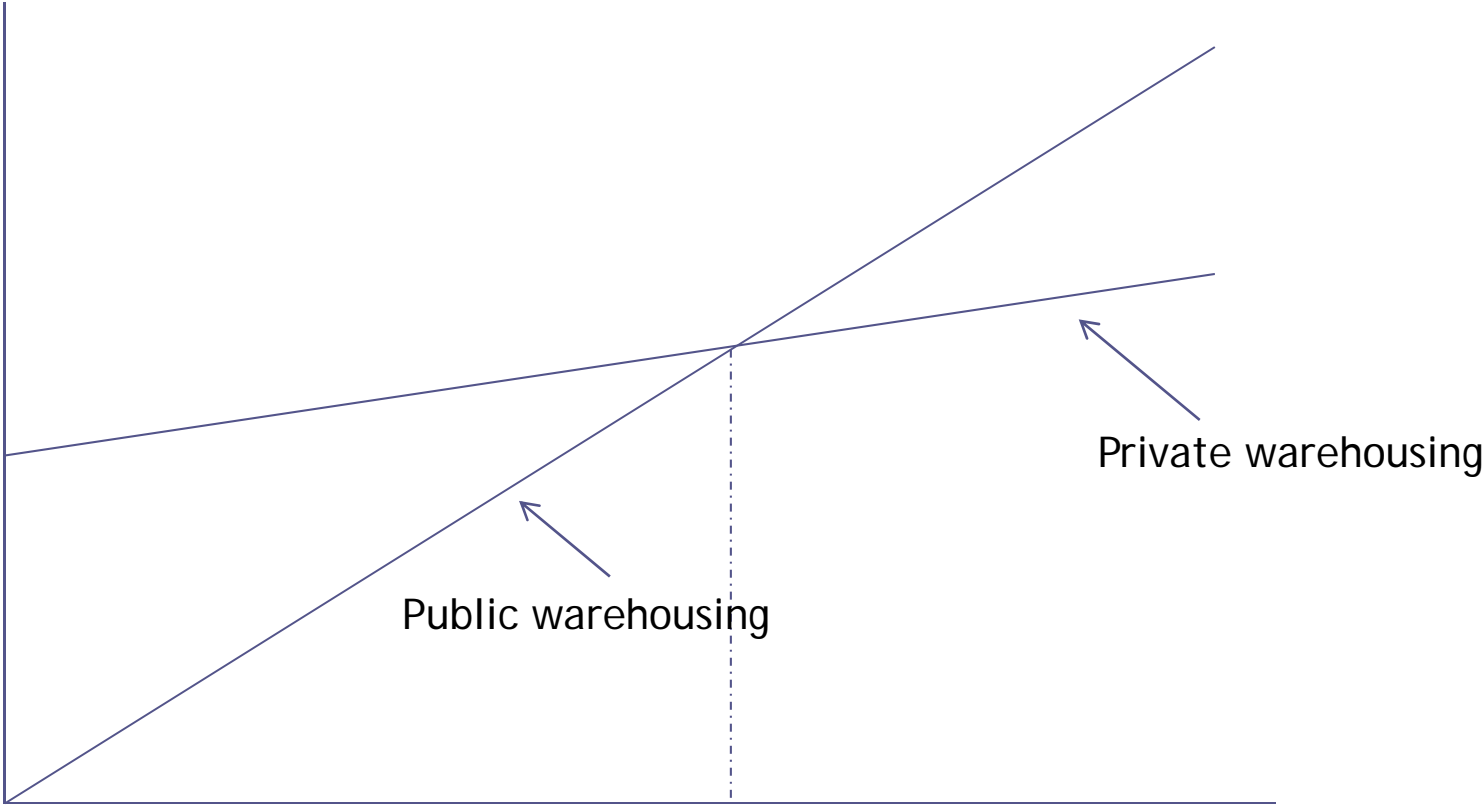
Total cost



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- Should an organization own and operate private distribution facilities or contract with third party logistics providers for distribution services?
  - Three choices for handling distribution requirement
    - Private facilities
      - Internal facilities owned by the organization producing or owning the goods
      - To store goods and distribute them to customers
    - Public facilities
      - External distribution option
      - Rents out space to individuals or firms needing storage capacity
    - Contract facilities
      - A customized version of public warehousing in which an external company provides a combination of distribution services that the organization itself has traditionally provided

# Distribution cost comparison

Total cost



Throughput volume

# Facility considerations

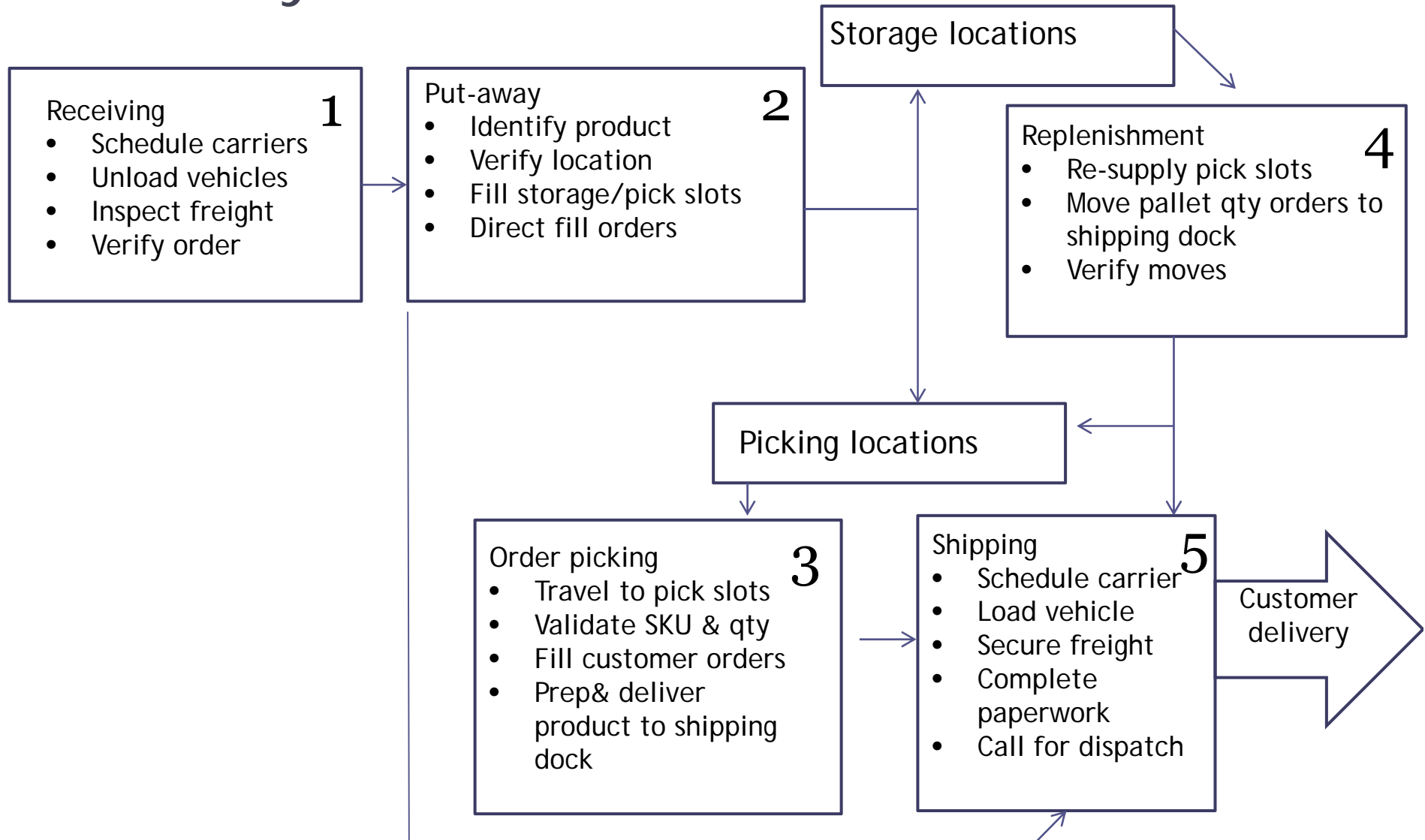
- Space is needed to interface with the transportation network
- Slotting - the placement of product in a facility for the purpose of optimizing materials handling and space efficiency
  - Main objective - to minimize or eliminate travel and the amount of time that a stock-keeping unit is handled
  - Three criteria are commonly used to slot product within a distribution facility- popularity, unit size, and cube



# Distribution execution

- Product handling functions
- Support functions

# Primary Distribution Center Processes





## Support functions

- Inventory control
- Safety, maintenance, and sanitation
- Security
- Performance analysis
- Information technology



# References

- Coyle J.J., Langley C.J. Jr., Novack R.A., Gibson, B.J. (2013). *Managing Supply Chains A Logistics Approach*. 9<sup>th</sup> edition. South-Western, Cengage Learning.