

# Chapter 16

## International Warehousing

# International Warehouses and Distribution Centers

- Warehousing Functions
- Location Decision
- Warehouse Ownership
- Warehousing Activities
- Warehousing Layout Options
- Warehousing Security
- Warehousing as a Marketing Tool

# Warehousing Functions

Warehousing has three functions:

- Inventory holding
  - Absorb differences in seasonal sales or input availability
  - Prevent disruptions in supply chain
  - Support marketing activities
- Shipment consolidation
  - Goods manufactured in different locations can be shipped to a single customer from a single point
- Additional services
  - After-sale services, warranty, repairs, labeling, re-packaging, for example.

# Location Decisions

A warehouse location decision is based on an analysis conducted at three separate levels:

- A national or regional level
- A municipal level
- A parcel or building level

# Location Decision: National Level

To determine which country or region of the world, companies consider:

- Infrastructure of the country (access to means of transportation, utilities, business services)
- Environment of the country (labor-force availability and training, costs, currency strength, overall political support of foreign investments)
- Culture of the country (management style's compatibility with culture)

# Location Decision: Municipal Level

To determine the city or general area, a company considers:

- The local infrastructure (access to highways, railroad, ports, airports, utilities, freshwater, sewer)
- The environment (local labor pool availability and training, quality of local schools, affordability of housing for employees, existence of a network of public transportation)
- The local political environment (local authorities' support for foreign investment, taxation, operating costs)

# Location Decision: Parcel Level

To determine the actual parcel or building to consider for a warehouse, a company considers:

- Operating costs (costs of acquiring land or building, construction costs, taxation, road access)
- Employee support (public transportation, proximity of child-care facilities, proximity to housing)
- Facility quality (building fundamentals, utilities, drainage, room for expansion, parking spaces)

Companies have to consider many factors in a location decision.



Warehouses with connections to road, rail, and water transportation systems in Turkey  
Source: Mehmet Cetin



# Warehouse Ownership

Warehouses can be of three types:

- A **public warehouse** rents space to any company seeking it, and the warehouse operates using its own employees and systems. For the user, a public warehouse is a variable cost.
- A **contract warehouse** is owned by the company using the space, but managed by another company that uses its own employees and systems to manage it.
- A **private warehouse** is owned and operated by the company using it, and it employs its own personnel and uses its own systems.

# Warehouse Activities

Warehouse activities can be divided into five broad categories:

- Receiving
- Storage
- Picking
- Packaging and Shipping
- Other Operations

# Warehouse Receiving

Chronologically, the first activity in a warehouse.

The supplier should be informed of:

- The correct pallet size so that goods do not need to be transferred from one pallet to another
- The markings and other labeling requirements of the warehouse
- The time at which goods can arrive

Warehouse personnel then inspect goods on arrival, and check quantities against the purchase order, before placing the goods in storage.

# Warehouse Storage

Storage is the most significant aspect of a warehouse. Goods can be placed:

- On the floor of the warehouse, in small stacks
- On low racks
- On high racks
- On rolling racks
- On vertical racks

Several less common options can also be used.



Pallets stored on the floor of a low-ceiling warehouse in Thailand  
Source: Sarawuth Wannasathit



Some pallets should not be stacked. They sometimes are, though, by simple negligence. A pictogram may be more effective than words.

Source: Tigervault



Pallets in a wide-aisle, low-height warehouse in Italy.

Source: Champiofoto



A narrow-aisle, high-bay warehouse in Russia.

Source: Petinov Sergey Mihilovich





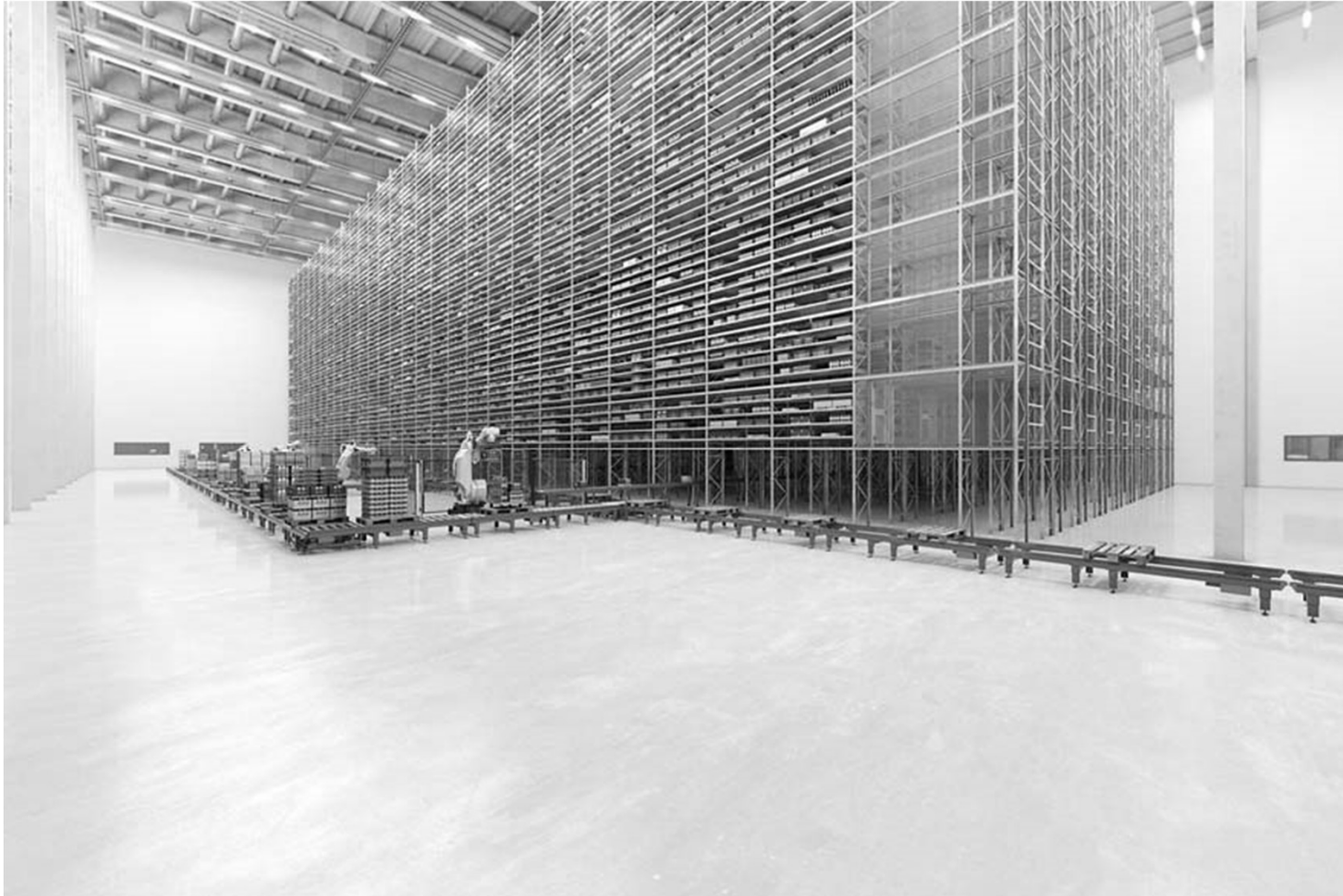
A very high-bay warehouse under construction in Germany  
Source: Voestalpine



A high-density movable rack system in a library.  
Source: unknown



A rolling-rack system for small parts in a warehouse in the United Kingdom  
Source: Baloncici



An automated storage and retrieval system (ASRS) in a warehouse

Source: unknown



Vertical carousel system for small parts  
Source: Patrick VanRuymbeke

# Warehouse Picking Strategies

Warehouse picking involves retrieving the items that a customer purchased from the shelves.

There are two main strategies:

- A goods-to-picker strategy has an automated system bring the goods to the picker for retrieval.
- A picker-to-goods strategy has the picker sent to the goods' location to retrieve them.



KIVA robots in an Amazon.com warehouse fulfilling a goods-to-picker strategy.  
Source: Amazon Robotics





A horizontal carousel can be used in a goods-to-picker strategy.  
Source: unknown





A picker-to-goods strategy asks the picker to move through the warehouse.  
Source: unknown

# Warehouse Picking Methods

In a picker-to-goods strategy, there can be several alternative methods:

- “Pick by order” where the picker picks one order at a time, not unlike what a shopper does in a supermarket
- “Cluster picking” where the picker picks multiple orders at a time, filling several carts or totes for different orders
- “Batch picking” where the picker picks multiple orders at a time but commingles them in one cart, to be sorted later
- “Zone picking” where the picker is responsible for picking goods from an area of the warehouse for all orders; the items are then separated by order later on

# Warehouse Picking Techniques (I)

In a picker-to-goods strategy, a warehouse can use several techniques:

- The “paper list” technique is simply a printed list given to the picker
- The “label picking” technique is a paper list where each label corresponds to an item, decreasing the probability that the picker will forget an item
- The “barcode picking” technique uses an electronic display on which the picker sees the next item to be selected, which the picker confirms by scanning the barcode of the item.

# Warehouse Picking Techniques (II)

- The “voice picking” technique utilizes a headset and an artificial voice to tell the picker what item needs to be selected. The picker confirms the item either with a barcode scanner or by repeating the item into a microphone. The computer records the selection with voice-recognition technology.
- The “light picking” technique uses a light display to tell the picker which item to select and in which quantity.



A picker retrieving multiple orders using a paper list in a cluster-picking warehouse (several orders picked at once).

Source: unknown

Label picking at Lands End in the United States: the top label identifies the item that the customer ordered, and the picker placed it there. The bottom label is the identification of the item, placed by the manufacturer.

Source: Pierre David





A picker retrieving an order using a bar-code handheld device in a Thai warehouse.  
Source:MooNoi Amphol



Another example of barcode picking: the forklift operator reads the display that instructs him of the next pick, which he confirms with the barcode scanner on the right.

Source: Warehouse Solutions





Voice picking: the headset tells the picker the item and the quantity, and the picker confirms his selection by voice.

Source: Warehouse Solutions



Light picking: the display tells the picker the location of the pick and the quantity needed.

Source: unknown

# Warehouse Packaging and Shipping

Chronologically, the last warehouse operation.

The packer selects the correct packaging, its size, and the packing materials so that the goods arrive at their destination without damage.

The shipping department determines the correct carrier for the goods, ensuring they are sent to their destination according to the preferences of the customer (lowest cost or lowest transit time).



Packaging the goods that have been collected by pickers. The chutes (on the right) provide packing pellets to fill the boxes.

Source: unknown



The staging area, where packaged goods wait until they are loaded on trucks.

Source: unknown

# Warehouse Other Operations

Warehouses frequently perform other operations:

- Warranty claims processing
- Returns
- Kitting (creating a kit with parts from several vendors)
- Light assembly
- Value-added services, such as repackaging or adding instruction booklets in retail packages



Light assembly or kitting can be performed in a warehouse.

Source: unknown

# Warehouse Layout Options

Warehouses include two different areas:

1. Fixed areas, such as receiving, packaging and shipping, and ancillary services, which are sized to accommodate the anticipated business volume
2. Storage areas that are designed in function of the mix of products that the warehouse handles (their size or value) and in the types of orders that it processes (small packages or full pallets).

Warehouse managers organize their storage areas according to variations of the A-B-C rule.



# A-B-C Rule

The A-B-C rule distinguishes between three types of products:

- The A class is made up of 20 percent of items, but they represent 80 percent of costs
- The B class is made up of 30 percent of items, representing 15 percent of costs
- The C class is made up of 50 percent of items, representing only 5 percent of costs

Warehouse managers re-interpret this rule to apply to volume of goods, to value, to order size, and other measures that allow them to organize their storage area most efficiently.

# Warehouse Security

The two primary security concerns in a warehouse are theft and physical damage to the goods during handling:

- Theft can be prevented by screening all employees and visitors and by implementing processes that reinforce security; one employee unloads a truck, another counts the goods.
- Physical damage to the goods can be reduced with good maintenance practices (cleanliness, lights, equipment upkeep) and with proper training of employees.

# Warehouses as a Marketing Tool

Warehouses reduce lead times and allow a company to provide faster delivery to its customers

Warehouses can provide value-added services to customers.

Warehouses are an integral part of the international supply chain.