

# 1

## Warehousing



### Learning Objectives

By the end of this chapter, you should be able to:

- List the functions of a warehouse.
- State the primary objectives of a warehouse.
- List the categories of resources found in a warehouse.
- State why a criteria for assessing a warehouse is important.

Warehouse operations are often mistakenly thought to exist in a static environment, where conditions and requirements rarely change and where warehouse planning entails the onetime activities of building a structure and providing equipment. Similarly, warehouse management is thought to be merely the supervision of a few simple, highly repetitive tasks. On the contrary, warehouse operations exist in a dynamic environment.

The sophistication and complexity of warehouse operations have increased dramatically in the past decade. Warehouse operations have been affected by customers, demands for rapid response and automation, with its resulting reduction in staffing and paperwork. With many wholesale, retail, and industrial firms adopting technologies such as automatic identification, just-in-time inventory control (JIT), and computer controlled purchasing systems, many warehouses have had to adjust to match the changing needs of their customers and the changing competition. The continual demands for greater product proliferation and better customer service have combined to create warehousing conditions and requirements that rarely remain constant for very long periods of time. Consequently, warehouse planning is, in fact, a continuous activity and warehouse management is a series of critical interaction among the warehouses' managers, workers, and users.

In addition to being a dynamic profession, warehousing is a challenging one. Perhaps the greatest challenge confronting the warehouse professional

is to alter the image attached to warehousing by companies and by society. In fact, over the past few decades, the warehousing function has indeed been the "whipping boy" for the manufacturing and marketing functions of most firms simply because few managers have identified the impact that more efficient and effective warehouse operations can have on the total system. A manager who does identify and understand the true value of warehousing in meeting the growing demands of product proliferation and better customer service and who is able to convince others of its importance will be the manager who finds her way to the boardrooms of her firm.

Although this course does not address private and public warehousing as two separate and distinct topics, references will be made to several of the unique features associated with each of these warehousing operations at the appropriate times. Private warehouses will be referenced as those facilities that are owned or leased for the purpose of satisfying the warehousing needs of the company that owns them. A public warehouse, on the other hand, will be thought of as a firm that is in the business of offering warehousing services to other companies for a fee. The objective of most public warehouse firms is to enter into a contract with one or more firms to handle their warehousing needs. Most contract warehouses charge their clients for shipping and receiving merchandise, storing units, and processing the associated paperwork. A benefit of utilizing the services of a public warehouse is that a firm can often place its products close to customer demand points without having to secure land or construct a building. Utilization of a public warehouse provides flexibility in locating inventories and a low level of commitment of people and equipment. The public warehouse will be referenced only when it is advisable to highlight a unique feature; otherwise, it will be assumed that the topics presented apply to both types of warehousing operations.

## **WAREHOUSING DEFINED**

Warehousing in its most basic form is simply holding goods until they are needed. The functions of a warehouse are to:

1. Receive the goods from a source.
2. Store the goods until they are required.
3. Pick the goods from the storage area when they are required.
4. Ship the goods to the appropriate user.

Oftentimes, a distinction is made between a finished goods warehouse and a raw materials storeroom. The fact is, however, that the functions performed in a finished goods warehouse, receive-store-pick-ship, are identical to the functions performed in a raw materials storeroom. Consequently, both are warehouses. The only true distinctions between the two are the source from which the goods are received and the user to whom the goods are shipped. A raw materials storeroom receives goods from an outside source, stores the goods, picks the goods, and ships the goods to an inside user. A finished goods warehouse receives goods from an inside source, stores the goods, picks the goods, and ships the goods to an outside user. Likewise, an in-process inventory

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*warehouse* receives goods from an inside source, stores the goods, picks the goods, and ships the goods to an inside user, while a *distribution warehouse* receives goods from an outside source, stores the goods, picks the goods, and ships to an outside user. The differences among these various warehouses are restricted to the perspectives of the sources, management, and users of the goods. If the primary functions of an activity are receive-store-pick-ship, then that activity is a warehouse, regardless of its position in a company's logistics, and the tools and techniques presented in this course can be successfully used to plan and manage that activity.

In today's highly competitive global economy many firms are automating their basic warehousing functions to achieve the increases in throughput rates or inventory turns required for their warehousing operations to be cost effective. As the computer and the associated data-capture equipment are inserted into a warehouse system a fifth warehousing function begins to emerge. That is the function of managing the information necessary to operate and coordinate automated material handling systems and computerized inventory management systems. As higher levels of automation and computerization are introduced, managing the flow of information becomes just as important as managing the flow of materials.

Many firms are going beyond the basic warehousing functions and are attempting to enhance their overall competitive advantage within the walls of their warehouses. As part of the typical warehousing tasks, firms are repackaging materials into smaller or larger sizes, placing bar code labels on cartons, putting customer unique wrappers or labels on products, and performing customer billing operations. There is a very wide range of activities that can be performed in the warehouse that will enhance customer satisfaction. A discussion of some of these activities will occur throughout this course.

## THE VALUE OF WAREHOUSING

At the end of this course, you will complete an examination and two case studies to test your grasp of the material. The most important question, however, will not come in a final examination. You must begin to answer it now: Does *warehousing add value to a product*? Failure to gain an understanding of the correct answer to this question will make the long-term application of the techniques and tools presented in this course an exercise in futility.

The traditional school of thought will conclude that, no, warehousing does not add value to a product; in fact, warehousing is strictly a cost-adding activity that is often a necessary evil. In firms that follow this school of thought, warehousing costs are typically classified as indirect costs, overhead, burden, other operating expenses, and so on. Often these cost categories are "spread out" over the direct costs of the firm in such a way that the cost of warehousing is no longer distinguishable.

The value of warehousing becomes very clear when you think of the thousands of square feet of expensive retail space that would have to be consumed if we did not have warehouses that supply our downtown department stores with replenishment inventories on a daily basis. Or we might consider

how much it would cost a company if every time a machinist needed a piece of bar stock a trip had to be made to the local steelyard. The costs of machine downtime and idle workers are all prevented through the warehouse function.

The true value of warehousing lies in having the right product in the right place at the right time. Thus, warehousing provides the time and place utility, or the availability, necessary to give materials in the proper form true value. From a warehousing perspective the objective of a firm should not be to sell products, but to get the products into the hands of the consumer so that the customer will pay for the products. Consequently, form utility without availability is worthless. Today's concept of warehousing goes far beyond the basic four functions of receive-store-pick-ship and includes many value added services. For example, some furniture manufacturers perform partial assembly work at the warehouse and many companies now stack their product on the customers' pallets.

From this view of value, warehousing should now project a different image in your mind. A vision of warehousing would be to think of the warehouse as a gate valve that controls the ebb and flow of product between the producing and consuming functions of an economic pipeline. In a global economic sense, warehousing is the logistics valve of our economy.

As we stated earlier, perhaps the greatest challenge of the warehousing professional is to help others identify this logistics value and understand the role of warehousing in their firms. (Exhibit 1-1 presents several typical roles and values the warehousing logistics valve has in our economy.) Warehousing professionals who are capable of conveying this message to the corporate leaders of today will become the corporate leaders of tomorrow.

## **THE OBJECTIVES OF WAREHOUSING**

The primary objective of warehousing is to maximize the effective use of the warehouse resources while satisfying customer requirements. The key phrases in this objective, which must be delineated to give the objective true meaning, are warehouse resources and *customer requirements*.

### **Warehouse Resources**

The resources of a warehouse are space, equipment, and personnel. To understand fully the importance of using space within the warehouse effectively, you must know the cost of space within the warehouse. Most warehouse managers have some knowledge of the cost of building or obtaining new space, but surprisingly few know the cost of maintaining the space. A warehouse whose available cubic space is used ineffectively annually loses a considerable sum of money in the form of these operating costs.

For example, consider the warehouse manager who was using several cubic feet of space immediately adjacent to the shipping and receiving area of his warehouse facility to store maintenance supplies, brooms, gardening equipment for the grounds crews, and a large mechanical sweeper. The use of this valuable

## **EXHIBIT 1-1** ***The Role of the Warehousing Logistics Valve***

<b><i>Warehouse Role</i></b>	<b><i>Example</i></b>	<b><i>Value of Warehousing</i></b>
Geographical consolidation	Centralized distribution center	Reduced order processing and transportation costs
Geographical dispersion	Dairy and bakery products	Reduced transportation costs
Seasonal demand	Snow shovels	Reduced manufacturing costs
Seasonal production	Corn	Allows year-round consumption

space for nonproductive storage was costing the warehouse thousands of dollars per year in lost productivity, taxes, insurance, and maintenance.

The equipment resources of a warehouse include data processing equipment, dock equipment, unit load equipment, material handling equipment, and storage equipment, all of which combine to represent a sizable capital investment in the warehouse. If you wish to obtain an acceptable rate of return on this investment, you must scrutinize the use of each piece of equipment to guarantee that it is being used most effectively.

Oftentimes, the personnel resource of the warehouse is the most neglected resource, even though the cost of this resource is usually great. For example, poorly planned order picking operations that involve one picker and a forklift truck may be costing the company as much as \$35 to \$40 for each hour that is unnecessarily consumed. A great deal of care must be taken when planning and managing a warehouse in order to encourage high labor productivity, good labor relations, and worker satisfaction.

### **Customer Requirements**

Customer requirements are simply the demand to have the right product in good condition at the right place at the right time. Therefore, the product must be accessible and protected. If a warehouse cannot meet these requirements adequately, then the warehouse does not add value to the product and, in fact, very likely subtracts value from the product.

Based on the assessments of a warehouse's resources and the customers' requirements, the following set of objectives defines the primary objective more clearly:

1. Maximize effective use of space.
2. Maximize effective use of equipment.
3. Maximize effective use of labor.
4. Maximize accessibility of all items.
5. Maximize protection of all items.
6. Maximize effective use of information.

A warehouse must be planned and managed with these objectives in mind.

## **DESIGN, ANALYSIS, CONTROL, AND MAINTENANCE OF WAREHOUSING OPERATIONS**

Regardless of whether you are designing a completely new warehouse or updating an existing facility, the recommended approach is to follow the engineering design process. Applying the design process to the design of a complete warehouse or to some subset of the warehousing activity requires that the full life cycle be taken into consideration. The first task should be to understand the goals, objectives, and expectations of the warehouse. A clear definition and understanding of the primary and support activities, and exactly how these various activities will impact the overall operation of the firm, must be established. Through a thorough analysis of the items to be stored in the facility, the space requirements can be specified. Several facility plans with their associated positive and negative features should be developed. The selection process for a facility plan should take into account operational feasibility, cost to acquire, cost to operate, safety, quality, personnel requirements, and any other features of importance to cost effective operations. With a design selected, a control plan for operation of the facility, and a plan for maintaining the equipment, the material flow process and the information flow process must be put into place. Monitoring and controlling warehousing activities can only be accomplished if a set of criteria for assessing the performance of the warehouse and the associated activities are established. It is the monitoring and the controlling activities that assists the warehouse manager in making adjustments in operating policies and in deriving the greatest return from the overall operation of the warehouse system.

### **A REVIEW OF THE COURSE**

The first part of this course is concerned with how to plan a warehouse that will satisfy the objectives of warehousing. Each of the first four warehouse objectives has a corresponding, specific planning activity, as indicated in Exhibit 1-2. The fifth warehouse objective, calling for the maximum protection of all items, will be achieved automatically if the previous four objectives are realized.

The sixth objective of maximizing the effective use of information is especially important in warehouses in which the material handling and storage activities are automated and the inventory control processes, accounting operations, and the development of picking lists are computerized. Chapter 3 addresses information resource management.

We will discuss each planning activity in a how-to format so that the techniques and tools can be easily applied by the reader.

The second part of this course concentrates on developing a sound management program for a warehouse. A sound management program is contingent on having an effective warehouse plan. The warehouse plan serves as a benchmark against which warehouse performance can be measured. The acts of measuring performance against the warehouse plan and taking corrective action when required constitute warehouse management.

## **EXHIBIT 1-2** **Correlation Between Warehouse Objectives and Warehouse Planning**

<b>Objectives</b>	<b>Planning</b>
Maximize effective use of space	Space planning
Maximize effective use of equipment	Equipment planning
Maximize effective use of labor	Personnel planning
Maximize accessibility of all items	Layout planning
Maximize protection of all items	The storing of goods in adequate space via the proper equipment by well-trained personnel in a properly planned layout
Maximize effective use of information	The efficient storing and retrieval of goods via the most effective equipment and practices, such as automatic identification and information technology

The development of a sound warehouse management program proceeds by concentrating on each of the functions of warehousing (receive-store-pick-ship) in order to identify the characteristics of a good system. Measures of warehouse performance are then constructed to assist management in the identification of deviations from these desirable characteristics. Once deviations are identified, management skill must be used to take corrective action aimed at realigning actual warehouse performance with established objectives.

A sizeable section of the course will examine procedures for detecting and controlling losses in the warehouse. Also, the topic of measuring warehouse performance receives a great deal of attention in Chapter 13.

### **CONCLUSION**

Although all warehouses are unique, owing to the unique circumstances of each, the types of problems faced in planning and managing warehouses are not unique. Consequently, a definite methodology can be followed to address these similar problems in all warehouses regardless of their location, size, and type of product stored, and the like. This science of warehousing is the subject of the remainder of this course. A special emphasis is placed throughout the course on managing and controlling various components of the warehouse.

## REVIEW QUESTIONS

1. Warehousing conditions and requirements typically: 1. (d)
  - (a) remain fairly constant over time.
  - (b) are fixed and typically change once per year.
  - (c) are very unpredictable.
  - (d) rarely remain constant over time.
  
2. A public warehouse is: 2. (b)
  - (a) typically open to the public for the purchase of items at wholesale prices.
  - (b) actually a firm that offers warehouse services for a fee.
  - (c) always owned by a group of small retail firms.
  - (d) usually requires the users to staff the facility with their people.
  
3. One difference between a raw materials storeroom, a finished goods warehouse, and an in-process inventory warehouse is regarding the: 3. (b)
  - (a) major functions performed.
  - (b) source from which goods are obtained.
  - (c) complexity of the operation.
  - (d) a and b.
  
4. A benefit(s) of public warehousing is that a firm 4. (d)
  - (a) can place products close to customers.
  - (b) will not need a contract.
  - (c) can store a wide range of products.
  - (d) a and c

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5. Many firms are going beyond the basic warehousing functions to enhance their overall competitiveness by performing activities such as:
- (a) labeling products with customer supplied labels.
  - (b) performing customer billing operations.
  - (c) performing repackaging operations.
  - (d) all of the above.
6. What are the four functions a warehouse performs?
- (a) \_\_\_\_\_
  - (b) \_\_\_\_\_
  - (c) \_\_\_\_\_
  - (d) \_\_\_\_\_
7. The primary objective of a company with regard to warehousing should be to:
- (a) always have a lot of warehouse space available.
  - (b) have a large inventory of products available.
  - (c) maximize the use of the warehouse resources while satisfying customer requirements.
  - (d) avoid oversized shipping cartons.
8. The main resources of a warehouse are (1) space, (2) equipment, and (3):
- (a) personnel.
  - (b) product liability insurance.
  - (c) the tax laws.
  - (d) government regulations.
9. The key to good monitoring and control of warehouse operations is:
- (a) good investigators.
  - (b) large budgets.
  - (c) a lot of people.
  - (d) a good set of criteria for assessing operations.
10. Measures of warehouse performance are good for:
- (a) completing government requests for information.
  - (b) purchasing computers and associated software.
  - (c) identifying deviations from good practice.
  - (d) developing packaging standards.
5. (d)
6. (a) Reception of goods from a source.  
(b) Storage of goods.  
(c) Picking of goods from a storage area.  
(d) Shipment of goods to a user.
7. (c)
8. (a)
9. (d)
10. (c)

