
UNIT 15 LOCATION AND STRUCTURE OF WAREHOUSE

Objectives

After completion of this unit, you should be able to:

- understand the role of warehouses in organization;
- appreciate the importance of warehouse location;
- know the factors that influence the decision making process while locating the warehouse;
- get an idea of the objective of warehouses layout;
- be familiar with the factors to be considered while planning the layout;
- understand the safety considerations while planning the layout; and
- understand the function and structure of warehouses.

Structure

- 15.1 Introduction
- 15.2 Warehouse Location
- 15.3 Warehouse Layout
- 15.4 Warehouse Safety
- 15.5 Warehouse Functions
- 15.6 Warehouse Structure
- 15.7 Summary
- 15.8 Self Assessment Exercises
- 15.9 References and Suggested Readings

15.1 INTRODUCTION

Warehouses play a vital role in the effective operations of a company. Incoming materials and supplies, in process goods, and finished goods are important assets to a business enterprise. In a majority of manufacturing organizations, materials constitute the major fraction of cost, i.e., 40 to 80% of total cost. The cost of capital blocked in inventories is substantial. Since production and consumption cycles rarely match, the success of any business, besides other factors, depend largely on the process of efficient storage and material control of these assets in order to provide uninterrupted supply to the points of use or consumption and the warehouse is the place for the operation of this process. Warehouse management is concerned with carrying the right kind of materials or goods in right quantity neither in excess nor in short supply and also keeping it safe against any kind of deterioration, pilferage or theft. Warehouse is the custodian of the organization's money, as money is locked up in stocks.

Business organizations utilize warehouses for a variety of needs. It may serve as a storage point and /or a transit facility for incoming, in process or outgoing goods and also for receipt trans-shipment of finished goods when located at some point between the company's plant and its customer.

15.2 WAREHOUSE LOCATION

The location of the warehouse is a crucial decision which has to be taken with utmost care as the process of relocation, once the facilities are installed and made operational, can be an expensive exercise.

The optimal location of warehouses result in the following advantages:-

- Minimization of total transportation, handling and other related costs.
- Minimization of delays in providing materials and goods to the point of use or consumption.
- Maximization of effectiveness of warehouse operations.
- Conservation of efficiency of human, machine and equipment.
- Better Facility planning.
- Lending flexibility and adaptability to the organisations futuristic outlook.

The factors that influence the location of warehouse:

- 1) **The point of use or consumption:** The point of use or consumption is an important criteria in deciding upon the location of warehouses. This ensures availability of the requirements in time. Delays in the availability of materials, goods or supplies can result in idle facilities and slippages in delivery commitment, which not only adds to the operating costs but also affects the goodwill and the organisation in the market place raw material warehouse is usually located near the first operation. in Process warehouse are near the subsequent operations and finished goods warehouse are near the shipping areas.
- 2) **The Size of the plant:** In large organizations it may not be possible to locate the warehouses which are convenient and equally accessible to all consuming units and at the same time be near to the material receiving section. This leads to the concept of decentralized warehouses. In such a case, a central warehouse can be located near the receiving station and issues can be decentralized by setting up sub-units of the control warehouse located close to the various user departments to meet their day-do-day requirements of essential supplies.
- 3) **The nature and classification of materials:** In case of heavy, bulky, perishable or critical items, the warehouse should be essentially located near the point of use or consumption, therefore the nature of the item is an important factor in deciding upon the location. The value, variety and volume of goods and materials to be handled should also be considered in the process of warehouse location .
- 4) **Material handling consideration:** The accessibility of the central receiving station by rail or road has a decisive role to play in the locational process. Also the warehouse location should lie, as far as practicable, in the flow path of material. This reduces the total cost of transportation and handling. The general principle during warehouse location is to minimize the kg-km of transportation and handling the materials.
- 5) **Locational factors for transit warehouses:** In case of transit warehouse located at some point between the company's plant and its customer or sources of supply, factors such as proximity to convenient means of transportation (by rail, road or port), sources of supply and market and also the availability of labour and power primarily influence the locational orientation.

- 6) **Models of facility planning:** For a rational and logical approach towards the locational decision making particularly in large size organizations, the models, of facilities planning can be applied effectively.

15.3 WAREHOUSE LAYOUT

Warehouse layout is the internal design or the functional design. An efficient layout and design is very important from the point of view of its functioning which is in turn, linked to the functioning of the plant. A good layout helps in easy receipt locating, packing, issuing and inspection of goods, dispatching the goods, effects proper storage and preservation and also simplifies stock taking. The efficiency of the storage system may be compared and assessed in terms of unit cost (per volume or weight) of moving goods through storage sites or storage area over a given period. It usually takes into account the elements of labour, space and equipment needs and costs.

In any specific storage system design, there may be some advantages in sacrificing the accessibility to stocks in favour of getting more stores in less space, or *vice versa*. Thus, while it is not possible to arrive at any absolute criterion for the efficiency of one storage system over another, the selection of the right system will depend upon assessing and evaluating the requirements in terms of the manufacturing strategy or the distribution strategy.

The size, design and layout of warehouse must, therefore be an integral part of a wider systems design and management strategy. It must also be realized, that what happens in a warehouse affects the whole range of other activities.

The objectives of a good warehouse layout are to achieve the following:

- 1) Maximum ease of operation with ready accessibility of major materials.
- 2) Straight line or semi-circular flow of materials from receipt to dispatch with minimum back tracking.
- 3) Maximum use of space for storage
- 4) Minimum handling of materials
- 5) Minimum traverse distances while materials get transported into and transported out.
- 6) Lowest possible need and use of material handling devices.
- 7) Preservation and protection of materials by ensuring adequate environmental conditions internally and externally.
- 8) Elimination of pilferage and thefts.
- 9) Easy, prompt and speedy physical verification and stock taking.
- 10) Flexibility of operations with a futuristic outlook.

The information needs while planning the layout are as follows:

- 1) Classification of store items by size, number, weight, frequency of handling, handling arrangements required and perishability.
- 2) Floor space and height required to store the items.
- 3) Deciding in advance whether to go for fixed location. Random location or Zoned location of stocks or a combination of these.

Fixed location: Stock can be found immediately without a complex system of recording but there can be a considerable waste of space.



Random Location: Space is better utilized, but good and elaborate records have to be kept about where the materials are.

Zonal Location: Goods of a particular product group are stored in a given area.

- 4) Units withdrawn/ issued at a time.
- 5) Maximum number of units to be stored at one time.
- 6) Storage facility required that best suits the items.
- 7) List of available storage space for different kinds of storage facilities.
- 8) Determining the sequence of laying out storage space for locating the materials.
- 9) Size and shape of the space available for laying out the stores.
- 10) Preparation of flow diagram of the flow of materials through the stores.

The features of a good layout are as follows:

- 1) Provision of sufficient number of passages (aisles) besides sufficient number of cross aisles. The area earmarked for aisles should not exceed 30% of the total area.
- 2) Provision of multi-dimensional shelves or sections for storing different items.
- 3) Receiving-end and dispatch-end are at opposite points.
- 4) Provision of emergency exit.
- 5) Provision for fire-fighting facilities advantage points and free of encumbrances.
- 6) Provision of lighting, ventilation, heating and refrigeration system installed wherever required.
- 7) Offices, clock rooms and toilets provided close to the receiving yard and dispatch yard.
- 8) The space for receipt and inspection provided adjacent to the main stores.
- 9) Effective utilization of the third dimension.
- 10) Proper markings made at various storage spaces to facilitate location and identifications.
- 11) The layout should permit the use of modern material handling equipments.
- 12) Provision for future expansion.
- 13) A pleasing and hygienic environment through proper selection of the colour of walls, provision for exhaust and cleaning.

Activity 1

Is it always not possible to implement a good warehouse layout? Comment on the management strategy keeping cost and time factors in mind.

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15.4 WAREHOUSE SAFETY

Warehouse safety is a very important aspect to be considered while designing and laying out the warehouse. Since large volume of goods are handled everyday

therefore the probability of occurrence of accidents cannot be ruled out. Accidents may cause damage to life and property and also reduces morals and effectiveness of the entire system.

Retrieval and Transaction
Processing System

The following measures are necessary if accidents are to be prevented:

- 1) Safety consciousness should be installed in the minds of warehouse personnel through training programmes, visual aids and literature.
- 2) Safety appliances or personal protective equipments like goggles, hand gloves, helmets etc., must be provided and their use must be encouraged.
- 3) Good housekeeping is essential, this means that gangways must be clean, adequately wide so that movement of forklifts, trolleys and industrial tractors is smooth. Stocking must be in appropriate locations so that handling is minimum.
- 4) All warehouse equipments must be kept in good order. This includes adequate maintenance practices with regard to forklifts, overhead cranes, trolleys, conveyors etc. operators must be trained in safety aspects so that safety precautions are not overlooked.
- 5) Healthy competition can be stimulated by installing safety awards and cash prizes which bring recognition to the concerned warehouse personnel for safety practices. This also motivates others to practice safety.
- 6) Provision of fire fighting facilities is necessary especially where inflammable materials are stored and handled. In point of fact, large organizations have a well-maintained fire fighting equipment with the warehouse in preparedness. This, in the long run reduces losses and insurance expenses. Fire extinguishers, fire escapes, alarms and sprinklers must be available and personnel should be familiar in handling them.
- 7) Other factors which merit attention include provision of toilets, exhausts, routine maintenance equipments, safe electrical wiring etc.

15.5 WAREHOUSE FUNCTIONS

The functions of warehouse can be classified as follows:

- 1) To receive raw materials components, tools, equipments and other items and account for them.
- 2) To provide adequate and proper storage and preservation to the various items.
- 3) To meet the demands of the consuming departments by proper issues and account for the consumption.
- 4) To minimize obsolescence, surplus and scrap through proper codification, preservation and handling .
- 5) To highlight stock accumulation, discrepancies and abnormal consumption and effect control measures.
- 6) To ensure good housekeeping so that material handling, material preservation, stocking, receipt and issue can be done adequately.
- 7) To assist in stock verification and stock accounting and provide supporting information for effective purchase action.
- 8) To implement and maintain quality systems in warehouses.

15.6 WAREHOUSE STRUCTURE

The warehouse structure can be decentralized or centralized depending upon the organizational requirements. In decentralized stores system, each section of the industry has a separate stores attached with it, whereas in centralized stores system, the main store is located centrally.

Advantage of Centralisation of Warehouse:

- Better supervision and control
- Requires less personnel to manage
- Better layout of stores
- Inventory checks are facilitated
- Optimum stores can be maintained
- Fewer obsolete items
- Better security arrangements can be made
- Less risk of loss by fire or theft
- Less chances of production stoppages due to prompt availability of materials.
- Reduced material handling and associated costs.
- Convenient for user departments

Disadvantages of Centralized Warehouse Systems:

- Congestion in the storeroom
- Chances of misappropriation and thefts of particular items
- Possible delays in service to user departments
- Advantage of decentralization of stores

Disadvantages of Decentralization of Warehouse:

- Greater inventory carrying cost
- Difficulty in supervision and control.

The warehouse structure should emphasize on centralized control and decentralized activity. The principal sections of a warehouse are generally:

- The receipt section
- The storage section
- The issue section

15.7 SUMMARY

Warehouse management is concerned with providing inventories in right quantity and quality and in the right time to the points of use or consumption. In this unit, the importance of location and layout of warehouse has been stressed upon as these factors greatly influence the overall organizational efficiency. Any warehouse system is a compromise between the use of space and the use of time. Choosing the most suitable system means dealing with a number of interacting and often conflicting factors. The success in achieving warehouse efficiency depend upon the careful consideration and evaluation of the various factors during the decision making process.

15.8 SELF ASSESSMENT EXERCISES

- 1) What are the factors to be considered while locating the warehouse?
- 2) Write a descriptive note on “efficient layout of warehouse”.
- 3) What are advantage and disadvantages of centralized warehouse and decentralised warehouse?
- 4) What are the objectives of a good warehouse layout?
- 5) Discuss the safety considerations while designing and laying out the warehouse.
- 6) Discuss the major functions of warehouse in an organization.
- 7) How would you choose the best location for a new warehouse?

15.9 REFERENCES AND SUGGESTED READINGS

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