UNIT-13 Introduction to Warehouses

Learning Outcomes
By the end of this unit the learner will be able to:
✓ Understand the functions and objectives of warehousing ✓ Explain warehousing in relation to a logistics strategy ✓ Discuss the most important activities in a warehouse setting

Unit 13

Introduction to Warehouses

Warehouses are known by a variety of different names, including logistics centres and distribution centres. Distribution centres are sometimes defined as the facilities used to house finished goods, prior to being shipped to final customers. Logistics centres, by contrast, may be used at various different points within the supply chain. Technically speaking, however, both still qualify as warehouses.

As a rough definition, a warehouse could be described as any facility or site where products or materials are stocked as they make their way through the supply chain. Warehouses are commonly used are storerooms, but can also be used for a variety of other important processes and activities.

Warehouses are used for storing materials, but this is just one of many important jobs carried out in warehouse environments. Some warehouses are used by companies to package and label products, or perhaps even put the finishing touches to products before making their way to their next destination. What's more, the warehouse is often to epicentre of an organisation's wider stock control and inventory management responsibilities.

Fitting into the Logistics Strategy

There are various questions that must be asked and factors to consider, when setting up and choosing an existing warehouse for a business. However, few are more important than establishing the appropriate size for the warehouse.

Key considerations when evaluating warehouse size requirements include the following:

- How many products the warehouse will store
- How much demand there is for each of these products
- The properties of the products to be stored - i.e. size, weight and dimensions
- Specialist storage conditions (climate control, awkward shapes etc.)
- Lead times from suppliers to customers
- Requirements for specialist handling equipment
- Target customer service level
- Economies of scale
- The plan and general facilities of the warehouse

The functions of the warehouse play an important role in a wider logistics strategy. A basic outline of the steps involved in establishing an effective warehousing strategy is detailed below:

1. **Examine the logistics policy** – setting the context and deciding what the warehouse has to attain.
2. **Examine existing operations** – to observe the failings and how these can be conquered.
3. **Design an outline structure** – finding the best major location and number of sub-depots, etc.
4. **Make thorough plans** – finding the mass of facilities, stock holdings, and material handling equipment, systems to expand, people to utilize, transport needs, and so on.
5. **Get closing approval** – submitting the plans to superior managers to concur the funding.
6. **Finalise building design** – purchasing land, choosing contractors and building.
7. **Finalise equipment design** – choosing equipment, suppliers, andpurchasing.
8. **Finalise systems design** – designing the ordering, inventory control, billing, goods location, monitoring, and all other systems needed.
9. **Fit out** – installing all equipment, systems, staff, and testing,
10. **Open and obtain stock** – to test all systems, finish training, and beginoperations.
11. **Sort out teething problems** – to get things running smoothly.
12. **Monitor and control** – ensuring that everything works as planned, measuring performance, and revising incentive schemes, etc.

Activities within a Warehouse

Basic Activities

Some of the most basic activities that take place in the vast majority of warehouse environments include the following:

- Receiving goods from upstream sellers
- Identifying the goods, matching them to orders and finding their planneduse
- Unloading materials from delivery vehicles
- Doing any essential checks on quantity, quality, and state
- labelling materials (usually with bar codes) so they can be recognized
- Sporting goods as essential
- Moving goods to mass storage area
- Holding goods in stock until required
- Moving materials from mass storage to a smaller picking store
- Picking materials from this store to meet orders
- Moving the materials to a marshalling area
- Assembling materials into orders
- Packing and packaging as necessary
- Loading delivery vehicles and dispatching the order

- Controlling all communications and connected systems, such as, inventory control and finance

Other Activities in Warehouses

One of the primary objectives for most businesses today is to move materials through the supply chain as quickly as possible. As a result, the role of the warehouse in a wider supply chain has evolved. Warehouses tend to be used for more dynamic movement of goods, rather than traditional long-term storage.

Warehouses are also commonly used as final assembly points for products, where their respective components are manufactured across a diverse range of locations. When the final steps of the manufacturing process are left until the last moment, this is referred to as postponement. It is a warehousing strategy that can boost flexibility and reduce the amount of finished stock that needs to be kept on hand - both of which are beneficial for the business.

The warehouse is also the most suitable place for packing and sorting products, ahead of delivery to their next destination.

Aims of Warehousing

Generally, the goal of a warehousing strategy is to provide a combination of high customer service and low costs, in order to sustain the wider logistics strategy. Some of the more specific aims of warehousing are as follows:

- Creating storage locations throughout the supply chain
- Ensuring materials and products are stored securely
- Boosting customer service quality
- Minimising damage and preserving material quality
- Accelerating and simplifying supply chain activities
- Boosting the efficiency of resource utilisation
- Ensuring materials are moved accurately and effectively
- Improving material sorting and storage activities
- Simplifying the consolidation and loading of materials for delivery
- Coping better with variations in demand and stock shortages
- Providing safe and amicable conditions for the workforce
- Establishing measures to cope with elevated or unexpected demand

Ownership

Many large businesses establish and run their own private warehouses. However, this often isn't an option for smaller businesses. Those who cannot afford to set up their own warehouses are more inclined to use the warehouses and related services offered by third-party service providers. There are even some larger businesses who prefer the flexibility and convenience of third-party

warehousing services - AKA public warehouses.

A private building may be purchased or leased, after which the business is free to do with it as it wishes. The company has complete control over the warehouse and all operations that take place therein.

Public warehousing is slightly different, in that the business enters into a fixed-term contract with the service provider. Public warehouses are available in all different shapes and sizes, along with facilities that cater to special requirements such as bulk storage, cold storage, sensitive materials storage and so on. The idea being that rather than setting up a new warehouse from scratch, you make use of the existing facilities available at a fee. Public warehousing can therefore be more affordable and flexible than private warehousing.

Some other benefits of public warehousing include:

- Flexibility to deal with changing demand, possibly due to seasonality
- Ability to access skills and knowledge that the business does not have internally
- Access to the newest equipment and practices
- Avoiding big capital investment, giving higher return on investment
- Easy access to a wider range of geographical regions
- Allows for immediate tests of working in new areas
- Use of economies of scale to reduce warehousing costs
- Consolidating loads with other organisations to decrease transport costs
- The guarantee of a high quality and well organized service
- Flexibility to deal with varying conditions, removing risks from dated practices and technologies.

Public warehousing has been growing in popularity for some time due to its unrivalled affordability and flexibility. In fact, it is comparatively rare for small or medium sized businesses to invest in their own private warehouses. The benefit of private warehousing for larger companies is considerably lower operational costs, after an elevated initial outlay. With public warehousing, it is the opposite - higher variable costs, but no excessive initial costs to cover.

Layout

General Layout

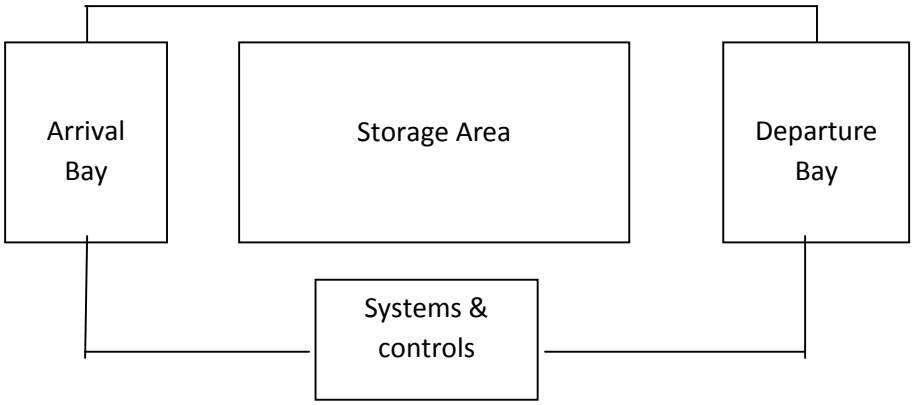
When setting up the warehouse - public or private - nothing matters more than deciding on an appropriate layout for the facility. This includes the installation of storage units, allocating areas for loading and unloading, storage bays, staff rooms, offices, equipment and so on.

It is important to remember that every decision made at this stage will have a profound impact on the performance and efficiency of the entire warehouse. Setting up a warehouse can be complex, costly and time consuming, so you need to ensure you are making appropriate decisions for your business.

The most important elements in a typical warehouse include the following:

- An arrival bay, where deliveries arriving from suppliers are checked and accepted
- Primary storage areas where the materials and goods are stored
- The equipment required for storing, retrieving and moving goods around the warehouse
- An appropriate information system to track and record goods arriving and leaving

The image below provides a very basic outline of the fundamental elements of a typical warehouse. There are significant differences in layout from one warehouse to the next, but all warehouses will nonetheless feature these essential primary components.



The Basic Layout of a Warehouse

Interestingly, the most general warehouse layout - which is the layout used by almost all shops and supermarkets - utilises two storage areas. Along with the mass storage area in which goods are held behind the scenes, there is also a secondary storage area in the form of the store's shelves. Goods arriving in the warehouse are broken down into smaller units and placed on shelves in the warehouse. When the smaller picking storage area (the shelves) runs low on stock, it is replenished using the additional stocks in the mass store.

Layout of Racking

The vast majority of warehouses use racking or shelving to store products and materials

Selecting the most appropriate solution means considering three important questions:

- What kind of racking should be used?
- What would be the most appropriate layout for the racking?
- Where and how will the materials/products be stored on the racks?

A basic formula for determining an appropriate racking design is as follows:

- ✓ Think about prospective demand for products and materials for the next five years
- ✓ Carefully consider how products or materials will enter, move around and exit the warehouse
- ✓ Assess the benefits and drawbacks of the movement equipment options available

- ✓ Consider accessibility for the most popular products and materials
- ✓ Work out how much space is required to store and move all items
- ✓ Design a broad-spectrum layout for the racking
- ✓ Determine which items should be stored close to or far from one another
- ✓ Create several rough draft outlines before agreeing on a final design

A few more advanced tips can help develop a superior layout:

- Prioritise the smooth movement of items throughout the warehouse
- Minimise the distance items need to travel wherever possible
- Focus on vertical storage to reduce the amount of floor space needed
- If possible, position offices outside the warehouse to maximise available space
- Don't make aisles so compact that they impede free movement
- Consider the installation of mezzanine floors if possible
- Think about implementing one way traffic and general movement policies

Locating Materials on Shelves

The effective and appropriate placement of materials on shelves can and will improve the efficiency and productivity of your warehouse. The more time it takes to place materials in their designated storage locations and retrieve them later when required, the greater the costs - in terms of both resource allocation and time. Strategic positioning of materials around the warehouse is just as important as establishing an effective layout for the facility in the first place.

Turnaround Time

This refers more to how quickly a warehouse is able to deal with delivery vehicles. Your warehouse must be able to quickly and efficiently cope with incoming deliveries and outgoing shipments alike, ensuring goods are loaded and unloaded as quickly and safely as possible. Both the layout of your warehouse and the protocol/policies you have in place for dealing with deliveries will determine the efficiency (or otherwise) of the subsequent turnaround times.

Materials Handling

Much of the work carried out in warehousing involves the physical movement of items and materials from one place to another. Deliveries are accepted from vehicles, moved around the warehouse (sometimes several times) and eventually sent out on departing vehicles. All of which falls under the heading of materials handling.

MATERIALS HANDLING refers to the movement of items and materials within warehouses, after being received and prior to being shipped out.

Important objectives in materials handling strategies include:

- Reducing the length and number of movements to accelerate material movements
- Enhancing the safety and consistency of material handling practices
- Minimising operational costs by reducing manpower/resource requirements
- Ensuring all materials can be moved quickly and efficiently at a moment's notice
- Increasing storeroom density, by reducing the quantity of wasted space
- Making the best possible use of all available space in the warehouse
- Introducing policies and standards to eliminate human error and mistakes
- Creating a safe working environment for the workforce

Manual Warehouses

The manual warehouse is the simplest and most traditional type of warehouse. This is where items and materials are placed on shelves or in storage containers, which are then retrieved manually by warehouse operatives as they are needed. As all storage and retrieval processes are manual, this system is only effective when the materials in the warehouse are light and small enough to be moved by hand. In addition, they must be kept within easy reach of the operative retrieving them.

Mechanised Warehouses

In a mechanised warehouse, machinery and devices are used to assist with the movement of materials. Typical examples of such devices include the following:

- Reach trucks
- Order-picking machines
- Forklift trucks
- Cranes
- Towlines
- Conveyors
- Tractors or trains
- Carousels

The introduction of mechanical devices can increase the capacity of a warehouse to deal with larger, heavier and more difficult items. In addition, vertical storage capacity is maximised with machinery such as forklift trucks, though it may be necessary to widen aisles and allow additional space for movement.

Automated Warehouses

Many operating costs associated with traditional warehouses can be reduced or even eliminated through automation. Advanced automated warehouses use sophisticated computer controlled

equipment to handle most of their material storage, retrieval and general handling requirements.

However, the initial investment in the technology required is substantial. This therefore makes automated warehousing a viable option for much larger businesses only, which move huge quantities of products and materials on a continuous basis.

An automated warehouse will typically have the following features and technologies:

- Comparatively narrow aisles that can be accessed by the machinery used to store and retrieve items.
- Considerably taller shelving and storage units, increasing material density and reducing distances when transporting items.
- Automated guided vehicles (AGVs) that transport items around the warehouse with no human control or supervision required.
- Advanced identification and sorting systems to separate deliveries upon arrival and store items in their designated locations.
- Automated administration and record keeping systems to maintain a log of all items entering and leaving the warehouse.

Choice of Equipment

There is a correlation between the appropriateness of mechanisation/automation and the volume of items/movements required within the warehouse. As a rule of thumb, warehouses with relatively modest storage and movement requirements can be operated manually, or with a few basic devices. By contrast, larger warehouses (like those of Amazon) would not be able to function as they do without enhanced automation.

Irrespective of whether you choose to go with a manual, mechanised or automated solution, you also need to think about the physical characteristics of the items (size, weight, shape etc.) and what will be needed to handle them. Not to mention, whether any products or items your warehouse will handle in *future* that may have different requirements to your current inventory.

Further Reading:

- ✓ ***INTRODUCTION TO WAREHOUSING, by 2nd Edition by Edward Frazelle***
- ✓ ***WAREHOUSE & DISTRIBUTION SCIENCE, John J. BARTHOLDI August 19,2014***