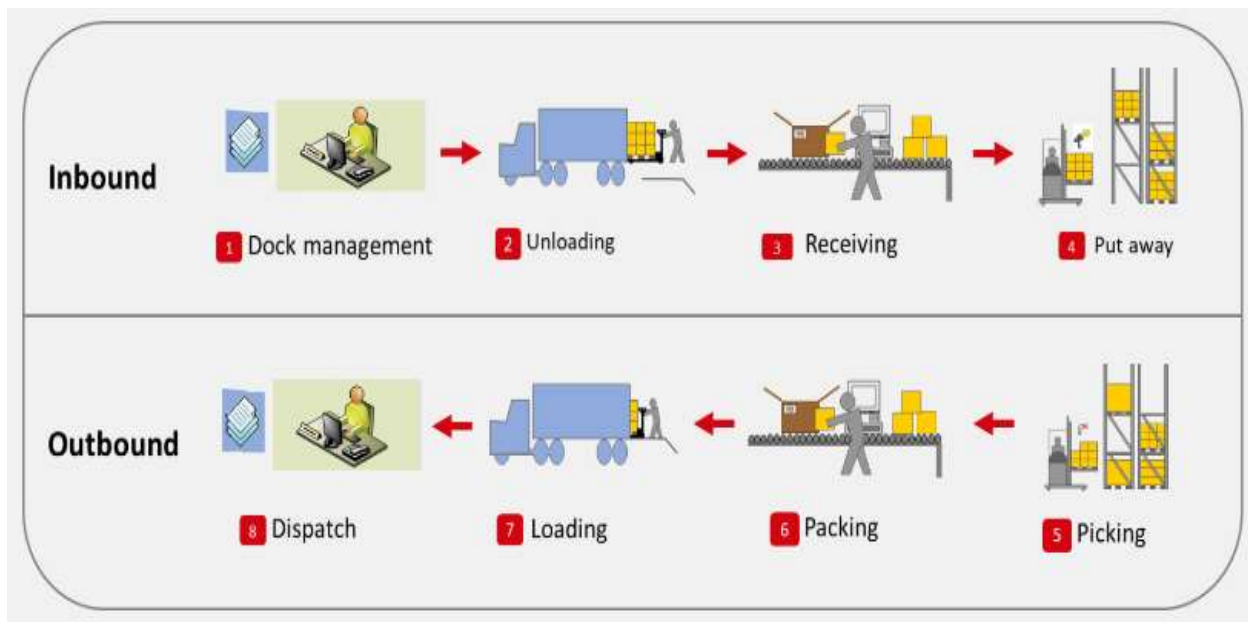


Cooperative Marketing

Level-II

**Based on March 2022, Version 2 Occupational
Standard**



Module Title: - Warehouse operation

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Table of Contents

Introduction to the Module	1
LO #1 Overview of Warehousing	2
Instruction sheet 1	2
Information Sheet 1	3
Self-check 1	10
LO# 2 Warehousing Functions	12
Instruction sheet 2	12
Information Sheet 2	13
Self-check 2	25
Operation sheet 2	27
LO #3 Distinguish Cooperative Marketing	29
Instruction sheet 3	29
Information Sheet 3	30
Self-check 3	37
Operation Sheet 3	38
LO #4 Inventory and stock control	39
Instruction sheet 4	39
Information sheet 4	40
Self-check 4	53
Operation Sheet 4	55
References	56

Introduction to the Module

Dear learner, the Ethiopian TVET system is now focused on the labor market demands and industry relevance. This translates that the main objectives of the TVET system is to qualify its graduates according to the occupational requirements of the industry. In this learning guide there are four learning outcome which are broken down in to four information sheets. These are listed as follows **Overview of Warehousing, Warehousing Functions, Warehouse equipment and Inventory and stock control**. In this learning guide, some learning activities and self-check exercises are included to make your study clear, attractive and precise. These are very important in deepening and enhancing your understanding of the learning out comes in the module. If you skip doing those activities and exercises, your level of understanding will be limited and insufficient. As a result, you are strongly dedicated and encouraged to do it on time accordingly. Upon the completion of the module you will be able to perform the objectives listed on instruction sheet.

Page 1 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

LG #7

LO #1 Overview of Warehousing

Instruction sheet 1

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Concepts and definitions of warehousing
- Nature and importance of a warehouse
- Types of warehouses
- Elements of warehousing
- Determining storage requirements
- Warehouse preparation planning

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Explain the concepts and definitions of warehousing
- Identify the nature and importance of a warehouse
- List down the types of warehouses
- Describe the steps in determining Storage Requirements
- Prepare warehouse preparation planning

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1

1.1 Concepts and definitions of warehousing

Warehousing has been one of the most important components in the field of agricultural or industrial activity as a whole. It forms an integral part in the orderly marketing chain as an important component of the logistics of distribution. For a developing economy, a warehousing system which provides adequate and safe storage of products on scientific lines is vital.

Warehouse is a place where the stock is housed. Simply, it is the house of materials or it is analogous to the rented accommodation or a guest house for the material in their journey along the movement of its supply chain. Obviously, the traveler as well as the transporter and materials manager would be very happy if there are no problems, no roadblocks, no bottle necks and no burdens throughout the journey tenure. Therefore, it is important to know issues and problems involved in warehousing since it is the critical stage in the supply chain.

1.2 Nature and importance of a warehouse

Warehouses in the past were constantly referred to as cost centers and also under the notion that they rarely add value. But there has been a step change in warehouse operations, owing to the movement of production into developing countries where cost of production is low, and at the same time increasing demands from consumers. Warehouses are now articulated as vital links within supply chains.

Materials flow is like blood of any organization, especially for a production system. Warehouse may be considered as the heart of the organization for the smooth running of the production line. A proper warehousing management makes the organization healthy and thence wealthy, because about 60 to 70 percent of investment in the form of working capital is contributed by materials in any industry.

Having minimum flow of materials constantly in the pipeline of the supply chain is a rare or rarest event. It is most unfortunate that the society and markets are not predictable most of the times and so the organizations need to hold stock at various stages within their supply chains.

Page 3 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

Raising consumer demands with widened ranges in customers' choices has resulted in a explosion of product ranges and sizes leading to unprecedented demands on storage capacity.

In addition to the above, there are several reasons to hold the stocks. So, let us now have a look at the reasons for holding stock by which the companies can derive some benefit the necessity for warehousing.

Uncertain and unreliable demand patterns

Some products often suffer inconsistent demand patterns based on the changeability of the customer test and preferences. To sustain under such most uncertain and erratic demand patterns, holding stock of raw material can only be the right alternative.

Transport and Shipping costs for Larger Shipments

It is common practice in the market that the business transactions of larger quantities are associated with cost reduction. So, the ability to move product in large quantities obviously tends to lower unit cost. Thus the trade-off here counts on the cost of storing additional units against the higher cost of transport for smaller deliveries. If the transport cost is quite attractive, then additional storage space will be needed. There also has to be a strong confidence that all the items purchased will be sold (in the case of retail warehouse) or all the items stored will be consumed (in the case of production warehouse).

Discounts on Bulk Purchase

The reduction of unit price by purchasing in larger quantities is always an attractive proposition for buyers. So, this requires an additional warehousing space/capacity. This bulk buying can, however, have overall negative impact if the company fails to sell/consume all of the additional units bought or constrained to sell at a loss to clear the warehouse. On the other hand, the situation raises costs due to additional storage and handling, obsolescence, damages, possible discounted sales and disposal.

Price Fluctuation (Raw Materials and Finished Goods)

In some cases, it may be for raw material or in other cases it could be for finished product, whatsoever, for certain products price fluctuates significantly and can also be affected by

Page 4 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

weather conditions. Companies therefore are forced to purchase significant quantities when the price is advantageous or when weather conditions dictate. This will necessitate additional storage capacity. Hence ultimate need is warehouse facility.

Producers Distance from Supplier and End User

In majority of the cases, the production unit will be either far away from the raw materials or from outlets or from both. In any case the manufacturer needs to store the materials, and thence requiring a warehousing facility. The distance that the raw material or finished stock needs to travel is a factor to determine the lead time, which in turn becomes deciding input for determining warehousing and warehouse capacity at manufacturer's location. The trade-off here is between more expensive local suppliers and producers and increased costs in transport and inventory holding costs.

Protection from Production Shutdowns

For example, on a given day suppose that you have planned to clean your overhead tank. So, for the period of time during which water is not available, you need to stock some water in advance. This creates the need for storage. Similarly, many production companies inevitably shut down their operations for vacations, machine maintenance, stock outs and stock counts. As a result, retailers and wholesalers need to pile up stock prior to the shutdown period to ensure stock availability for their customers. Manufacturers will also pile up a stock of components to ensure that their production lines are not brought to a standstill as a result of supplier shutdowns.

Ability to Increase Production Runs

Alterations or adjustments in production lines in order to accommodate changes in models, color, design features, etc and is often expensive. The longer the production run, the lower is the cost per unit to produce. Thus production runs might go longer some times. This raises the need for storage to safeguard the smooth flow in the supply chain during the elongated period in the production run.

Manage Seasonal Production

Some items can be produced in certain season, while its consumption may be continuous throughout the year, e.g. food grains, grocery items. Similarly certain items are produced yearlong, but will have a huge demand in certain season such as umbrellas, sweaters, etc. In the first case, the storage is required to use throughout the year, while in the second case, the stocks have to be piled up to meet the demand. In either case, there is dire necessity to store the material and balance the supply and demand.

1.3 Types of warehouses

You have learnt that warehousing caters to the storage needs of different types of commodities. In order to meet their requirement various types of warehouses came into existence, which may be classified as follows:

- i. Private Warehouses
 - ii. Public Warehouses
 - iii. Government Warehouses
 - iv. Bonded Warehouses
 - v. Co-operative Warehouses
- Below we discuss each of these.

Private Warehouses - The warehouses which are owned and managed by the manufacturers or traders to store, exclusively, their own stock of goods are known as private warehouses. Generally these warehouses are constructed by the farmers near their fields, by wholesalers and retailers near their business centers and by manufacturers near their factories. The design and the facilities provided therein are according to the nature of products to be stored.

Public Warehouses - The warehouses which are run to store goods of the general public are known as public warehouses. Anyone can store his goods in these warehouses on payment basis. An individual, a partnership firm or a company may own these warehouses. To start such warehouses a license from the government is required. The government also regulates the functions and operations of these warehouses. Mostly these warehouses are used by manufacturers, wholesalers, exporters, importers, government agencies, etc.

Page 6 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

Government Warehouses - These warehouses are owned, managed and controlled by central or state governments or public corporations or local authorities. Both government and private enterprises may use these warehouses to store their goods.

Bonded Warehouses - These warehouses are owned, managed and controlled by government as well as private agencies. Private bonded warehouses have to obtain license from the government. Bonded warehouses are used to store imported goods for which import duty is yet to be paid. In case of imported goods the importers are not allowed to take away the goods from the ports till such duty is paid. These warehouses are generally owned by dock authorities and found near the ports.



Figure 1:1: Goods stored in a warehouse

Co-operative Warehouses - These warehouses are owned, managed and controlled by co-operative societies. They provide warehousing facilities at the most economical rates to the members of their society.

1.4 Key Elements of warehousing

Warehouse layout design

At the outset, for designing an installation and thence, achieving optimal warehouse logistics management, it should have a good layout. The strategy for preparing a good layout depends on two decisive situations whether creating a new facility or reconfiguring an already running warehouse.

Page 7 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

Handling Equipment & Storage Systems

Warehouse materials management encompasses the set of operations involved in the operations such as

- Preparing,
- Locating,
- Moving and
- Storing

The above functions form the essential part of warehouse management. Goods storage and handling resulting from the interactions among operators, machines, storage devices and working methods in moving, storing and controlling materials become important aspects in warehouse management. Thus, it is important to understand and manage two kinds of equipment and their system Storage equipment and Handling equipment

Picking and order preparation

Picking processes have a considerable impact on certain warehouse logistics strategies. These include the movement and extraction of products from the racks as well as order sorting, consolidation, packing and dispatch. The organization of picking has significant role to play on the work and working method in warehouse and its logistics.

Stock and inventory management

Within warehousing, stock management is yet another important area task with regulating and optimizing stock levels in the installation. Now-a-days, this activity is done by computers using computer programs that accurately track inventory movements.

Warehouse safety and security

In the day to day management on an installation, both the logistics staff and merchandise in stock are exposed to a series of risks. Hence, the aspect of safety cannot be ignored in warehousing logistics.

Page 8 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1 September, 2022
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1.5 Determining warehouse requirements

There are a range of factors to consider while deciding on the location of a new warehouse facility. These may vary depending on whether you are selecting a location for a temporary building or selecting from one of a number of existing buildings. These may include:

- The nature and characteristics of goods to be stored;
- The nature of handling equipment available;
- Duration of storage needed i.e. short term or long term;
- The need for other activities, e.g. repackaging, labeling, kitting, etc;
- Access and parking for vehicles; number of loading docks required.

1.6 Warehouse preparation planning

Space layout: The areas that should be planned are both the general storage areas and the areas for goods receipt, consignment picking and goods dispatch. It is also desirable that space should be set aside for the following activities:

- Equipment maintenance and parking;
- An area for garbage disposal e.g. empty packaging;
- A quarantine area for keeping rejected goods,
- Goods to be sent back or destroyed;
- An employee rest area;
- Washroom; and an administration office.

Planning: It is worth keeping these requirements in mind during the planning of the main operating areas. Planning consideration needs to be given to the following:

- Allocate space for each type of product and locating number;
- Allow sufficient space for easy access to the stacks for inspecting, loading and unloading.
- Sizing the goods receipt and dispatch area;
- Allow space for storage of cleaning materials and supplies;
- Allocate areas for damaged items by consignment number;
- Allow sufficient space to repackage damaged items and place it in separate stacks;
- Sufficient free space is needed to operate a warehouse effectively.

Page 9 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1 September, 2022
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Self-check 1	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below

Test I: Choose the best answer

- Which of the following is the reason for the need of warehousing?
 - To sustain production runs
 - Managing seasonal production
 - To get discount on bulk purchase
 - All of the above
- Which of the following is a factor for determining warehouse requirements
 - The need for other activities, e.g. repackaging, labeling, kitting
 - The nature of handling equipment available;
 - Duration of storage needed i.e. short term or long term;
 - All of the above
- Warehouses which are run to store goods of the general public are said to be _____.

a. Private warehouses	c. Bonded warehouses
b. Public warehouses	d. Cooperative warehouses
- Some items can be produced in certain season, while its consumption may be continuous throughout the year, this statement refers to the need of _____.

a. Warehouse	c. Warehouse planning
b. Equipment maintenance	d. All of the above
- Which of the following statement best describes a warehouse?
 - a place where the stock is housed
 - a house of materials
 - a guest house for the material
 - all of the above

Test II: provide short answer for the following questions

1. Visit any organization of your choice and Observe the warehouse layout design, Handling Equipment and Storage Equipment. Present your observations.

LG #8	LO# 2 Warehousing Functions
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Instruction sheet 2	
<p>This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:</p> <ul style="list-style-type: none"> • Warehouse operations • Documenting warehouse operations • Roles and responsibilities of a warehouse manager • Benefits of warehousing • Storage handling methods based on characteristics of goods <p>This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:</p> <ul style="list-style-type: none"> • Describe warehouse operations • Describe the roles and responsibilities of a warehouse manager • List down the benefits of warehousing • Describe storage handling methods based on characteristics of goods 	
Learning Instructions:	
<ol style="list-style-type: none"> 1. Read the specific objectives of this Learning Guide. 2. Follow the instructions described below. 3. Read the information written in the information Sheets 4. Accomplish the Self-checks 5. Perform Operation Sheets 6. Do the “LAP test” 	

Information Sheet 2

2.1. Warehouse functions

Warehousing bridges the gap between the production and the needs of the consumer. The task is to provide what is required, when it is required, in the conditions in which it is required, and to do all these things economically. In essence, warehousing provides time and place utility for any product through efficient management of space and time. To evaluate the role of warehousing in business one needs to appreciate the ways in which warehousing functions and adds value to products. The common functions of warehousing are: Stockpiling, Product Mixing, Consolidation and Distribution.

Stockpiling: It refers to the use of the warehouse as a reservoir to handle production overflows. Such reservoirs are needed under two situations (i) seasonal production and level demand and (ii) level production and seasonal demand. For example, the canner of tomato products builds a warehouse inventory at harvest time, while customer demand for the product is fairly level throughout the year. Against this, in case of the toy manufacturer, the highest demand comes at certain seasons or holidays, but the manufacturer may need to stockpile in order to accommodate seasonal demand. In either case, the warehouse is the reservoir used to balance supply and demand.

Product Mixing: A cooperative having production farms in different locations also has the opportunity to use a product mixing warehouse to combine the produce in the entire line. For example, one food manufacturer has factories in several communities, with each factory to order full carloads or truckloads containing a mixture of the entire line, warehousing points are selected at locations that permit economical mixing of the product.

Consolidation: It refers to the use of warehousing for gathering goods that are to be shipped to final destination. Warehousing costs are justified by savings in outbound shipping costs achieved through volume loads. In one case, a fast-food company uses consolidation warehouses to serve clusters of retail stores, thereby reducing costs and frequency of small shipments to the stores.

Page 13 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

Suppliers of the food company are instructed to place volume loads of their products in these consolidation centers. This enables the fast-food company to cut its transportation costs by moving its supplies closer to its food serving outlets. At the same time, the food retailer reduces inventory costs by arranging for its suppliers to retain title to these inventories until they are shipped from the consolidation center.

Distribution: It is the reverse of consolidation. Like consolidation, it is justified primarily by the freight savings achieved in higher volume shipments. Distribution involves the push of finished products by the manufacturer to the market, whereas consolidation involves the pull of supplies by the customer. Both consolidation and distribution provide service improvements by positioning merchandise at a convenient location. Both involve cost tradeoffs that balance warehousing expenses against transportation savings. Both provide improved time and place utility for inventories.

2.2. Warehouse operation

A warehouse reorganizes and repackages product. Product typically arrives packaged on a larger scale and leaves packaged on a smaller scale. In other words, an important function of this warehouse is to break down large chunks of product and redistribute it in smaller quantities. For example, some agricultural product may arrive from the cooperative farm or in huge quantities but be shipped out to customers in case quantities; other farm input may arrive as cases but be distributed out to members of the cooperative as units. In such an environment the warehouse operations are generally more labor-intensive.

In general, the smaller the handling unit, the greater the handling cost. It can require much labor to move 10,000 boxes of paper clips if each box must be handled separately, as they may when, for example, stocking retail stores. Much less labor is required to handle those 10,000 boxes if they are packaged into cases of 48 boxes; and still less labor if those cases are stacked to a pallet.

Page 14 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

Even though warehouses can serve quite different ends, most share the same general pattern of material flow. Essentially, they receive bulk shipments, stage them for quick retrieval; then, in response to customer requests, retrieve and sort, and ship them out to customers.

The reorganization of product takes place through the following physical processes

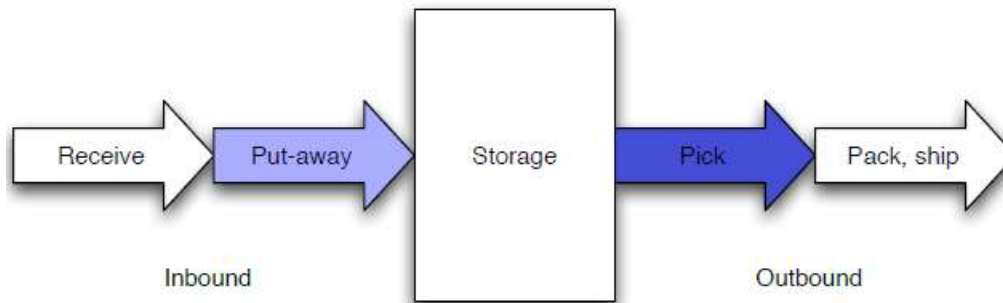


Figure 2.1: The warehouse operation

A. Inbound processes

- Receiving
- Put-away

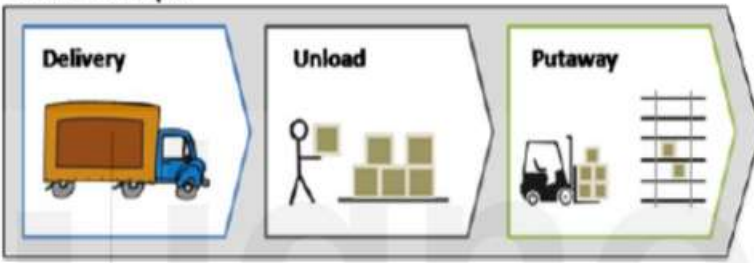
B. Outbound processes

- Order-picking
- Checking, packing, shipping

Receiving: Receiving may begin with advance notification of the arrival of goods. This allows the warehouse to schedule receipt and unloading to coordinate efficiently with other activities within the warehouse.

Once the product has arrived, it is unloaded and possibly staged for put away. It is likely to be scanned to register its arrival so that ownership is assumed, payments dispatched, and so that it is known to be available to fulfill customer demand. Product will be inspected and any exceptions noted, such as damage, incorrect counts, wrong descriptions, and so on.

Good Receipt



Product typically arrives in larger units, such as pallets, from upstream and so labor requirements are not usually great. (However, mixed pallets may need to be broken out into separate cartons; and loose cartons may need to be palletized for storage.) All-in all, receiving accounts for only about 10% of operating costs in a typical distribution center.

Put-away: Before product can be put away, an appropriate storage location must be determined. This is very important because where you store the product determines to a large extent how quickly and at what cost you later retrieve it for a customer. This requires managing a second inventory, not of product, but of storage locations. You must know at all times what storage locations are available, how large they are, how much weight they can bear, and so on. When product is put away, the storage location should also be scanned to record where the product has been placed. This information will subsequently be used to construct efficient pick-lists to guide the order-pickers in retrieving the product for customers. Put-away can require a fair amount of labor because product may need to be moved considerable distance to its storage location. Put-away typically accounts for about 15% of warehouse operating expenses.

Order-picking: Order picking is the process of locating and pulling product from your warehouse inventory to fulfill a customer order. On receipt of a customer order the warehouse must perform checks such as verifying that inventory is available to ship. Then the warehouse must produce pick lists to guide the order-picking. Finally, it must produce any necessary shipping documentation and schedule the order-picking and shipping. Large production companies handle these activities typically by a warehouse management system, a large

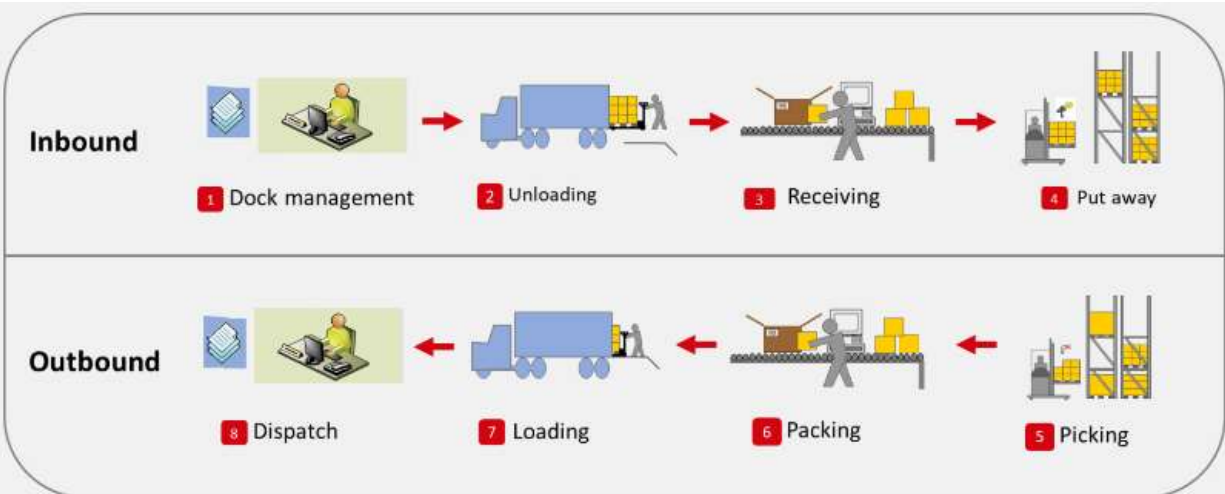
software system that coordinates the activities of the warehouse. This is all part of the support to expedite the sending of the product to the customer.

Checking and packing: Packing can be labor-intensive because each piece of a customer order must be handled; but there is little walking. And because each piece will be handled, this is a convenient time to check that the customer order is complete and accurate. Order accuracy is a key measure of service to the customer, which is, in turn, that on which most businesses compete.

Inaccurate orders not only annoy customers by disrupting their operations, they also generate returns; and returns are expensive to handle. One complication of packing is that customers generally prefer to receive all the parts of their order in as few containers as possible because this reduces shipping and handling charges. This means that care must be taken to try to get all the parts of an order to arrive at packing together. Otherwise partial shipments must be staged, waiting completion before packing, or else partial orders must be packaged and sent.

Packed product may be scanned to register the availability of a customer order for shipping. This also begins the tracking of the individual containers that are about to leave the warehouse and enter the system of a shipper.

Shipping: Shipping generally handles larger units than picking, because packing has consolidated the items into fewer containers. Consequently, there is still less labor here. There may be some walking if product is staged before being loaded into freight carriers. Product is likely to be staged if it must be loaded in reverse order of delivery or if shipping long distances, when one must work hard to completely fill each trailer. Staging freight creates more work because staged freight must be double-handled. The trailer is likely to be scanned here to register its departure from the warehouse. In addition, an inventory update may be sent to the customer.



2.3. Documenting warehouse operations

Inward/outward operation: Inward record is one of the registers in the organization which keeps the track of all the goods inward. When a goods-vehicle enters premises of the organization from a supplier, an entry should be made in the inward register (usually placed at the entrance) to record date, time and, Bill No., Supplier Name, Material Particulars, Quantity, Vehicle No., and Name of Driver etc.

Table 2:1 Materials inward record format

Material Inward Record									
Inward No.	Date	In-time	Bill (or) Challan No.	Supplier Name	Material Particulars	Quantity	Vehicle No.	Driver's Name	Security Signature

An entry should be made in the outward register to record the date of dispatch, time, Bill No., Name & Address of the Party (to whom sent), Material Particulars, Quantity, Vehicle No., Name of the driver and etc., when the good are dispatched from the organization as shown in table below.

Table 2:2 Material outward record formats

Material Outward Record									
Outward No.	Date	Out Time	Bill (or) Challan No.	Name & Address of the Party	Material Particulars	Quantity	Vehicle No.	Driver's Name	Driver's Signature

Dispatch Record: Dispatch Record is an important document in any company. All details regarding documents or parcel or other material which are sent through courier or post or transport should be noted down in Dispatch Record for future aspect and proper follow-up. Dispatch Record is as important as stock register. The format of courier dispatch record and transport dispatch register might be different in different organization, but most of the items included in the format are presented below.

Table 2:3: The format of courier dispatch record

Courier Dispatch Record Format								
S.No.	Date	Party Name	Charges	DOC No.	Courier	Weight	Destination	Remarks

Docket Number/Gr.Number (Goods Receipt Number): Every transport or courier service provides a unique number against goods it receives. This number is used to locate the position of goods. It is also used for any future reference or till goods is received at destination.

Table 2:4: Transport dispatch register format

Transport Dispatch Register Format								
S.No.	Dispatch Date	Party Name	Case	G.R. No.	G.R. date	Transport Name	Destination	Remarks
Receive		The number of case present in consignment				Courier services Name		

Rejection records: In any manufacturing and production, the product rejection becomes a big loss to the industry. It directly affects product cost. The reason is that all the manufacturing/production processes are done on the product from raw material to final product. In this process, human resource costing and others costs are included at the final stage that on the stage of finalization, if any product is rejected, that company should bear that big cost of rejected quantity. Hence the product rejection can increase the production costing.

If the product rejection is higher, it needs the management to step out immediately to control the rejection to minimize the costing as well as to save the reputation of the company in the market; records of the rejection always show the manufacturing conditions. The concern inspectors, third parties, customers focus on company rejection record and analyze it to understand quality system of the company. Information given in the rejection report is given below and as shown in the table no. 2.5.

Table 2:5: Rejection Report Format

Rejection Report								
Rejection Report Period: _____ Report No. : _____ Report Date: _____								
S.No.	Product	Job Order No	Customer Id	PO No. & Date	Job Qty	Accepted Qty	Rejected Qty	Reason For Rejection

Return records: Returns Record or Return Book is the book, in which, details of return products are recorded for which the payment is not done immediately. There are many reasons for the products get returned by customers. Few of the reasons are given here.

- Defects in the products
- Delay in the dispatch of products to the customers
- Over-supply of products
- Products are not being in accordance with the samples and specifications
- Violation of the terms and conditions of the contract, etc.

Products returned by the customers are known as ‘Returns inwards’. A model of return records is shown in the following table no.2.6

Table 2:6: Return Records format

Date	Name of the suppliers	L.F.No.	Credit Note	Amount		Remarks
				Details	Total	

Ledger Folio Number

Description of goods returned by the buyer, quantity returned.

2.4. Warehouse materials handling principles

The principles can allow in knowing the significant risks that can be available with manual material handling processes. These are all the principles to consider when boosting the warehouse material handling process.

Work Principle: To minimize the material handling work, it's advisable to know the service level to offer and ensure that you won't sacrifice productivity. Measuring the work in material handling will entail the count per unit of time, weight, and volume, multiplied by the total distance covered.

Simplifying your team's work will entail eliminating, shortening, combining, or reducing any unnecessary moves. Check all the materials that require additional movement like set-down and pickup, to know where you can reduce the distance. If possible, your team can take advantage of gravity to reduce the effort spent when moving materials. However, there should be safety measures to negate any injuries during movement.

Planning Principle: All material handling plans should be deliberate according to the functional specifications, performance objectives, and client needs. These methods or plans ought to be available at the outset. Also, any plan should involve the planners and anyone who will benefit from these plans. The best material handling plans should also indicate the available problems, the workaround, the goals, and future requirements. Furthermore, it has to promote the process design, product engineering, material handling methods, and process layout.

System Principle: There has to be full integration of storage activities and material movement in the warehouse. The coordinated system should handle the assembly, storage, inspection, production, unitizing, packaging, transportation, shipping, handling of returns, and order selection. Any system integration method should help identify products and materials by determining their status and location in the supply chain. System integration should factor in customer requirements by ensuring on-time delivery, good quality, and quantity.

Automation Principle: Automation of material handling operations will increase responsiveness, predictability, consistency, and operational efficiency. Before automating any

Page 22 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

operations, re-engineering and simplifying the existing processes is necessary. It ensures the resolution of all interface issues, be it equipment to operator, equipment to load, or equipment to equipment. Simplifying the existing processes will require for all the items to have features that accommodate the automation. It eliminates the risk and damage of materials in the warehouse.

Standardization Principle: Standardization of the material handling processes allows easy achievement of objectives and additional flexibility. The planner has to know the different tasks that the equipment can handle to improve the operating conditions. Standardization will impact the choice of equipment and operating procedures. In return, it can boost the modularity and flexibility of the material handling processes.

Space Utilization Principle: Unorganized spaces and clutter have to be eliminated in the warehouse. For the storage areas, there has to be a balance between selectivity and accessibility. Even when maximizing the storage density, all the materials ought to be readily accessible.

2.5. Roles and responsibilities of a warehouse manager

In the past, it was believed that the manager of a warehouse had only one or a few responsibilities in order to save the costs and earns more profits and safeguards the material. However, this carries a little truth in present day business environment. Warehouse managers today have to do more with less, and get better results from limited resources, more than ever before. A warehouse manager's job is to provide the environment where individuals are internally motivated to do the best job possible, in the best spirit possible, to make the best contribution possible. A warehouse manager is one who is responsible for a vital part of the supply chain process, who manages people, processes and systems in order to ensure goods are received and dispatched appropriately, and that productivity targets are met. Warehouse manager will be also responsible for workplace health and safety standards and for the security of the building and stock. The warehouse manager needs to achieve high customer service levels and also has to reduce cost through improved productivity and performance. Further, warehouse manager has to focus in achieving the six basic principles of warehouse management namely accuracy, cost control, cleanliness, efficiency, safety and security.

Page 23 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

The purpose of warehouse manager is to plan, develop, implement, and manage effective and efficient warehousing, storage, and distribution needs. Warehouse managers are accountable for ensuring the efficient management and control of the warehouse operation in the process of achieving agreed budgetary and service levels. They provide an effective and reliable service to customers by meeting all legal requirements. Warehouse managers focus in organizing the safe and efficient receipt, storage and dispatch of warehouse materials, goods and products to feed business operations and customer demand.

Characteristics of a Successful Warehouse Manager

Managers play a crucial role in raising warehouse efficiency. A manager who can get along with the entire team will be a great asset to the warehouse. For this, a warehouse manager should possess few characteristics which stated as below:

- Needs to have good business sense.
- Should always try to provide the best possible service within a budget.
- Should be Flexible.
- Must be able to adapt to changing business demands.
- Needs to be able to start developing new types of systems.
- Must be able to adopt new technology and apply it where it can be useful.
- Should be a team player
- Able to work with different people and departments

Self-check 2	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below.

Test I: Choose the best answer

- The process of locating and pulling product from your warehouse inventory to fulfill a customer order is said to be_____?
 a) Shipping
 b) Order-picking
 c) Checking and packing
 d) Consolidating
- Which of the following refers to the use of warehousing for gathering goods that are to be shipped to final destination?
 a) Consolidation
 b) Product mixing
 c) Stockpiling
 d) Distribution
- Once the product has arrived, it is unloaded and possibly staged for put away refers to which warehouse operation?
 a) Order-picking
 b) Checking
 c) Receiving
 d) Shipping
- Delivery, unload and put away refers to which of the following?
 a) Shipping
 b) Order-picking
 c) Receiving
 d) Packing
- Which of the following is the reason for returning products?
 a) Defects in products
 b) Delay in dispatch of products
 c) Over supply of products
 d) All of the above

Test II: Provide short answer

- For a textile manufacturer, what kind of picking strategy you suggest and why? Prepare a report justifying your suggestion.

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Page 25 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1 September, 2022
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2. Visit at least three retailers near you and find out how some of the goods are becoming obsolete and how are they disposing them off?

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3. List and discuss the role and responsibilities of a warehouse manager with characteristics and provide an example on each?

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Operation sheet 2

Name.....

ID.....

Date.....

Time started: _____ Time finished: _____

Instructions: Given necessary information you are required to perform the following tasks within **1 hour**. The project is expected from each student to do it.

1. Visit any organization nearby you; observe different types of records being maintained there. Write your observations here. Give suggestions for improvement.

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2. Visit any warehouse near to you and study the activities carried out in it. Categorize the activities according to its process and prepare a report on the deficiencies encountered.

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LG #9	LO #3 Distinguish Cooperative Marketing
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Instruction sheet 3
<p>This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:</p> <ul style="list-style-type: none"> • Purpose and types of materials handling equipment • Product movement equipment's • Product storage systems <p>This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:</p> <ul style="list-style-type: none"> • Describe the purpose and types of materials handling equipment • Elaborate product storage and product movement • Discuss about storage systems
Learning Instructions:
<ol style="list-style-type: none"> 1. Read the specific objectives of this Learning Guide. 2. Follow the instructions described below. 3. Read the information written in the information Sheets 4. Accomplish the Self-checks 5. Perform Operation Sheets 6. Do the “LAP test”

Information Sheet 3

3.1. Purpose and types of materials handling equipment

There are many types of special equipment that have been designed to reduce labor costs and/or increase space utilization. Storage and retrieval equipment can reduce labor costs by:

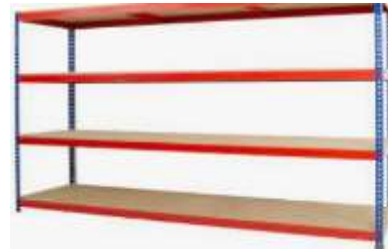
- Allowing many stock keeping units to be on the pick face, which increases pick density and so reduces travel per pick, which means more picks per person-hour
- Facilitating efficient picking and/or restocking by making the product easier to handle (for example, by presenting it at a convenient height and orientation).
- Moving product from receiving to storage; or from storage to shipping. Storage equipment can increase space utilization by:
- Partitioning space into sub regions (bays, shelves) that can be loaded with similarly sized stock keeping units. This enables denser packing and helps make material-handling processes uniform.
- Making it possible to store product high, where, up to about 30 feet (10 meters) space is relatively inexpensive. (Above this height, the building requires additional structural elements.)

Storage equipment: By storage mode we mean a region of storage or a piece of equipment for which the costs to pick from any location are all approximately equal and the costs to restock any location are all approximately equal. Common storage modes include pallet rack for bulk storage, carton flow rack for high-volume picking, and (static) shelving for slower, lower-volume picking.

Material handling equipment is any tool used to aid in the movement, protection, storage, and control of materials and products. Without the proper equipment and systems in place, your company is more likely to damage products or fall behind in productivity. By knowing more about material handling equipment, you can better equip your warehouse or distribution center with the proper equipment and systems for your company's needs.

Page 30 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

- **Drawers, bins, and shelves:** These are the most basic storage items commonly used to store smaller materials in an organized manner.



- **Racks:** Racks help companies store materials in accessible locations, and they save floor space.

- **Stackers:** Like forklifts, stackers help lift and stack heavy loads on the dock or in the warehouse.



- **Bucket elevators:** These elevators (also known as grain legs) assist with hauling bulk materials vertically.



- **Silos:** Silos are towers that hold materials. Materials that are typically stored in silos include grain, woodchips, coal, and sawdust.



- **Hand trucks:** Hand trucks (also called dollies) are a simple piece of equipment designed to give operators the leverage they need to move heavy materials to new locations.



- **Side loaders:** Side loaders are built to fit in narrow aisles. They pick up items from different directions, making them ideal when a warehouse has aisles close together.



- **Pallet trucks:** Otherwise known as forklifts, pallet trucks are machines operators use to lift heavy pallets. The forks slip under the pallet, lift it, and secure it as the operator takes it to a new location.



3.2. Product storage systems

Since, there is several different warehouse storage systems are available in the market today, there are many storage options before being dispatched or sold. It is always a good idea to be aware of various storage and shelving options, which could become a good input for

Page 32 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1 September, 2022
---------------	--	------------------------------------	-------------------------------

optimizing the store space. To better expose to the big world of warehouse storage systems, there are six most common types of warehousing based their shelving and structure.

i. Static Shelving

As the name indicates, static shelves are storage mechanisms that are stationary and are designed to stay in one place. Usually, they are intended to hold inventory that is fairly lightweight, may be up to a few hundred kg per shelf.



This is commonly found in the warehouses storing inventory that needs continuous replenishment.

Since, they are not compatible with forklifts, static shelving is often used for the inventory that are manually picked and/or placed. There may be in two categories of shelving as open racks or closed racks. For larger inventory, a wide-span shelving system, has to be designed that can hold more weight and can be used in higher-elevation configurations.

ii. Mobile Shelving

Mobile shelving is similar to static shelving but with a difference of mobility. This is a completely adjustable shelving system that is meant to hold the manually-picked items. With mobile shelving, shelves or cabinets are mounted on carriage and rail systems, eliminating fixed aisles and increasing productivity by making inventory more accessible, even when space is tight.



Thus, the advantage here is that many of these systems are designed to hold more items in less space. Mobile shelving designs typically include level tracks that can either be manual or mechanized. Further, they may be equipped with locking systems to control access to inventory.

Page 33 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1 September, 2022
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iii. Pallet Racking

For the busiest and largest warehouses, pallet racking systems are usually treated as the Centre piece of the operation. Typically, pallet racking systems are made out of wood, metal, or plastic and hold inventory that is received in large boxes. Depending on the height, the boxes are placed on the pallet racking system with the help of a forklift or an automated mechanism.



iv. Multi-Tier Racking

Multi-tier racking system is designed to capitalize on vertical space. Here, we have a great choice for large stocks of items that have small unit sizes. When no warehouse is one-size-fits-all, many multi-tier racking options are flexible, with the ability to add or remove tiers depending on the current needs.

Page 34 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1 September, 2022
---------------	--	------------------------------------	-------------------------------



Mostly, multi-tier racking concerns relatively lightweight items that are picked and organized manually. To get the most out of this warehouse storage system, we need to organize each tier strategically and pack items as densely as possible. At the same time paying attention is to be given to weight limits and ceiling-to-rack height compliance guidelines.

v. Mezzanine Flooring

If the budget permits and the strategic warehouse layout allows for it, mezzanine flooring is an effective and space-saving storage option. Mostly mezzanine flooring is a second (may be third and fourth also but rare) floor that is constructed above the main warehouse floor.



Owing to the intrusive nature of the building, this could be one of the more expensive options that a warehouse can choose, but it also has the most potential for customized features, such as lighting, lift-systems, and conveyors. Workshops, go downs, households and some shopping malls may use this type.

Page 35 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

vi. Wire Partitions

While mezzanine flooring is one of the more high-tech options, wire partitions are on the other end of the spectrum. Wire partitions are, effectively, strategically-placed wire cages that are meant to be installed and torn down quickly and easily.



Often, the inventory that is housed within wire partitions is the item that may need special security. Some warehouses are even known to use wire partitions to construct makeshift, temporary offices for managers who work on the floor.

Page 36 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

Self-check 3	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below.

Test I: Choose the best answer

- Which type of warehousing concerns relatively lightweight items that are picked and organized manually?
 - Wire Partitions
 - Mezzanine Flooring
 - Multi-Tier Racking
 - Pallet Racking
- Storage mechanisms that are stationary and are designed to stay in one place are said to be_____.
 - Static Shelving
 - Mobile Shelving
 - Pallet Racking
 - Multi-Tier Racking
- Towers that hold materials like grain, woodchips, coal and sawdust are called_____?
 - Silos
 - Bucket elevators
 - Stackers
 - Hand trucks
- Storage and retrieval equipment reduces labor costs through_____?
 - Efficient picking
 - Easier movement of products
 - Partitioning space in to sub regions
 - All of the above
- A completely adjustable shelving system that is meant to hold the manually-picked items is called_____?
 - Static shelving
 - Mobile shelving
 - Pallet racking
 - Multi-tier racking

Test II: Provide short answer

- Discuss all product storage systems with appropriate materials to be stored?

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LG #10	LO #4 Inventory and stock control
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Instruction sheet 4

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Inventory and stock control principles
- Methods and processes for determining stock
- Inventory and stock control processes
- Methods of reordering
- Factors that impact reordering and stock control levels

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- List down inventory and stock control principles
- Describe the methods and processes for determining stock
- Identify the methods of reordering
- Describe the factors that impact reordering and stock control levels

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information sheet 4

4.1. Inventory and stock control

Introduction

Inventory is simply a stock of physical assets having some economic value which can be either in the form of material, money or labor. Inventory is also known as an idle resource as long as it is not utilized. Inventory may be regarded as those goods which are procured, stored and used for day-to-day functioning of the organization.

Inventory control is the technique of maintaining stock items at desired levels. In other words, inventory control is the means by which material of the correct quality and quantity is made available as and when it is required with due regard to economy in the storage costs, ordering costs, set up costs, manufacturing costs, purchase prices and working capital. There are following three main issues involved in inventory management and control: -

- How and what to prioritize for procurement?
- How much to order?
- When to order?

In this learning outcome, these issues have been discussed and their associated techniques are also described in detail.

4.2. Types of inventory

Raw Materials inventory

Purchased items or extracted materials that are converted via the manufacturing process into components and/or products. They are stored in the warehouse and are non-phantom items.

Semi-finished Goods inventory

Semi-finished goods are items that have been stored uncompleted, awaiting final operations that will adapt them to different uses or customer specifications. Semi-finished goods are made under the instruction of an order, using the components issued by a picking order, and stored in the warehouse when finished. Semi-finished goods are not sold to the customers.

Page 40 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

Finished Goods inventory

A finished good is a product sold as a completed item or repair part, i.e., any item subject to a customer order or sales.

Work-In-Process inventory

Products in various stages of completion throughout the plant, including all material from raw material that has been released for initial processing up to completely processed material waiting for inspection and acceptance as finished goods.

Maintenance, Repair, and Operational Supplies inventory

These are items used in support of general operations and maintenance such as maintenance supplies, spare parts, and consumables used in the manufacturing process and supporting operations. These items are used in production but do not become part of the product.

4.3. Methods of inventory control

You know that the maintenance of proper stock of each item of stores is one of the main functions of stores department. If large quantity of stores is maintained it would lead to huge investment, large space coverage, dangers of deterioration in quality, etc. On the other hand, less stock will result in frequent purchases, higher costs, loss of production etc. It implies that there is always a limit to the minimum and maximum quantity of materials in stores.

A. ABC Analysis

For the purpose of exercising selective control over materials, manufacturing concerns find it useful to divide materials into three categories. An analysis of the annual consumption of materials of any organization would indicate that a handful to top high value items (less than 10 per cent of the total number) will account for a substantial portion of about 70 per cent of total consumption value. Similarly, a large number bottom items (over 70 per cent of the total number of items) account for only about 10 per cent of the consumption value. Between these two extremes will fall those items the percentage number of which is more or less equal to their consumption value. Items in the top category are treated as 'A' items, items in the bottom category are called as 'C' category items and the items that lie between the top and the bottom are called 'B' category items. Such an analysis of materials is known as 'ABC analysis'.

Page 41 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1 September, 2022
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The logic behind this kind of analysis is that the management should study each item of stock in terms of its usage, lead time, technical or other problems and its relative money value in the total investment in inventories. High value items deserve very close attention and low value items need to be devoted minimum expense and effort in the task of controlling inventories.

The material manager by concentrating on 'A' class-items is able to control inventories and show visible results in a short span of time. By controlling 'A' items and doing a proper inventory analysis, obsolete stocks are automatically pinpointed. ABC analysis also helps in reducing the clerical costs and results in better planning and improved inventory turnover. ABC analysis has to be resorted to because equal attention to A, B and C items will not be worthwhile and would be very expensive.

B. Fixing Stock level

In order to ensure that the optimum quantity of material is purchased and stored, Inventory Control neither more nor less, the storekeeper applies scientific technique of material management. Fixation of certain levels for each item of materials is one of such techniques. The following levels are generally fixed:

Re-ordering level

You should know the level at which the storekeeper will initiate the requisition for the purchase of materials for fresh supplies. This level is referred to as re-order level or ordering level. This level normally lies between the maximum and minimum stock level. This level will usually be higher than the minimum stock level to cover for emergencies as abnormal usage of material or unexpected delay in delivery of fresh supplies. The fixation of this level normally takes into consideration the lead 'time (period of supply or re-order period), rate of consumption and the economic ordering quantity.

Re-ordering level can be calculated according to any one of the following formulas:

Re-order level $\text{Re-order level} = \text{Maximum consumption} \times \text{Maximum re-orders period}$

OR

$\text{Re-order level} = \text{Minimum level} + \text{consumption during the time required to get fresh deliveries}$

Illustration: Calculate the re-order level from the following information:

Maximum consumption = 400 units per week

Page 42 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

Minimum consumption = 250 units per week

Re-order period = 4 to 6 weeks

Solution Re-order level = Maximum consumption X Maximum re-order period
 $= 400 \times 6 = \mathbf{2,400 \text{ units}}$

Illustration Find out the order level from the following information:

Maximum stock = 2,500 units

Minimum stock = 1,000 units

Time required for receiving the material a 10 days

Daily consumption, of material = 50 units

Solution
 Re-order level = Minimum stock level + consumption during the period required for fresh delivery =

$$1,000 + 50 \times 10 = 1,000 + 500 = \mathbf{1,500 \text{ units}}$$

Minimum Stock level

Minimum stock level points to the level of an item of material below which the stock in hand is not normally allowed to fall. In other words, it refers to the minimum quantity of a particular item of materials which must be kept in stores at all times.

This limit is fixed so as to avoid the possibility of suspension of production due to shortage of material. In fixing this level the following important factors, among others are taken into consideration:

- i) Lead time i.e., time lag between indenting and receiving of material .
- ii) Rate of consumption of material during the lead time
- iii) Re-order level

Minimum stock level can be determined by applying the following formula:

Minimum stock level = Re-order level - (Normal consumption X Normal re-order period)

Illustration Calculate the minimum stock level from the following data:

Net normal consumption = 400 units per week

Normal re-order period = 5 weeks

Re-order level = 3,500 units

Page 43 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1 September, 2022
---------------	--	------------------------------------	-------------------------------

$$\begin{aligned}
 \text{Minimum stock level} &= \text{Re-order level} - (\text{Normal consumption} \times \text{Normal re-order period}) \\
 &= 3,500 - (400 \times 5) \\
 &= 3,500 - 2,000 \\
 &= \mathbf{1,500 \text{ units}}
 \end{aligned}$$

Maximum stock level

It is that quantity of material above which the stock of any item should not be allowed to exceed. The main object of fixing the maximum stock level is to avoid undue investment in stock and to use the working capital in a proper way.

The following formula is generally used for the calculation of maximum stock level.

$$\text{Maximum stock level} = \text{Re-order level} + \text{Re-order quantity} - (\text{Minimum consumption} \times \text{Minimum re-order period})$$

Danger level ' This is generally a level below the minimum level. When stock reaches this level, urgent action is needed for replenishment of stock. If no emergency steps are taken to restock the materials, the stores will be completely exhausted and normal production stopped. At this level no further issues are made by the storekeeper except on special requisition approved by the works manager. The level is generally calculated by taking into account the time required to get the materials by the quickest possible means of transport i.e., minimum time required for obtaining supplies from any possible source.

It is calculated as follows: $\text{Danger level} = \text{Average consumption} \times \text{Maximum re-order period for emergency purchases}$

Average stock level $\text{Average stock level} = \frac{1}{2}(\text{minimum stock level} + \text{maximum stock level})$

Depending upon the availability of information average stock level can also be calculated as follows:

$$\text{Average stock-level} = \text{Minimum stock level} + \frac{1}{2} \text{ Re-order quantity}$$

C. Re-Order Quantity

It is helpful to determine in advance to how much to buy when the stock reaches the re-order level. This quantity is known as re-order quantity (ROQ). The quantity ordered must be such that when the same is received the stock level will not exceed the maximum stock to be carried at any point of time. The re-order quantity is also referred to as the economic order quantity. It is called

Page 44 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1 September, 2022
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'economic order quantity' (EOQ) because the purchase of this size of materials is most economical.

Purchase of material larger than the economic order quantity of material will result in increase in the carrying cost. If on the other hand small - quantities of materials are purchased at frequent intervals the ordering cost will increase and will lead to disruption in the production due to inadequate inventory. The economic order quantity is fixed at such a level as to minimize the cost of ordering and carrying the stock. It is the size of the order which produces the lowest cost of material ordered.

Carrying cost includes the interest on investment, obsolescence losses, space costs, storage charges such as warehouse rent, insurance, heating and lighting expenses on stores staff, pilferage, breakage etc. The cost of ordering is independent of the size of the order and includes costs due to extra purchasing, handling and transportation costs, higher price due to smaller order quantities, frequent stock outs, resulting in disruption of production schedules, overtime and extra set up time, loss of sales and customer goodwill etc.

The economic order quantity can be calculated by making use of the following formula:

$$EOQ = \sqrt{\frac{2UO}{I}}$$

Where: EOQ = Economic order quantity

U = Annual usage in units

O = Cost of placing one order including the cost of receiving the goods

I = Cost of carrying one unit of inventory for one year

Illustration

From the following particulars calculate the economic order quantity

Annual usage = 6,000 units,

Cost of the material per unit = Birr 2.50

Cost of placing and receiving one order = Birr 15.00

Annual carrying cost of one unit = 20% of inventory value

Page 45 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

Solution

$U = 6,000$ units

$O = 15.00$ Birr

$I = 20\%$ of $2.50 = 0.50$

Substituting the values in the above formula

$$\sqrt{\frac{2 * 6000 * 15}{0.50}}$$

This is equal to: **600 units**

D. Perpetual Inventory System

In order to facilitate regular checking and to obviate closing down of work for stock taking, a method of recording stores balances after each receipt and issues is adopted. This method is known as perpetual inventory system. Bin cards and the stores ledger help the management in maintaining this system as they make a record of the physical movements of the stock on the receipts and issues of materials and also reflect the balance in the stores. To ensure the accuracy of perpetual inventory records, physical verification of stores is made by a program of continuous stock taking. It is advisable that a number of items should be counted and checked at frequent intervals and compared with the bin cards or stores ledger. The actual stock of material should not differ from the recorded stock under normal circumstances.

4.4. Methods of reordering

In order to exercise proper control over materials, it is necessary to record the physical movement of every item of materials. One of the main functions of the storekeeper is to maintain records for receipts, issues and balances of various items of materials. Bin card and stores ledger are the two important store records that are generally kept for making a record of the various items of stores.

Bin Card: A bin card provide a quantitative record of the receipts issues and balance of material. A bin is a place where the goods are stored. A bin may be a shelf, an, open space etc. depending upon the nature of the commodity. These cards are usually attached to or place near the bin so that receipts and the issues may be entered therein as soon as they take place. Separate

Page 46 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022

bin cards are prepared for each item of stores and if two different materials are kept in one shelf, two bin cards one for each item are prepared, treating the shelf as two bins.

Company Name
Bin Card

Material Nam: Material Code: Location		Maximum Stock level Minimum Stock Level Reorder Level				
Date	Receipt		Issue		Balance	Name
	GRN #	Qty	Request #	Qty		

The bin card provides a continuous record of the stock in each bin and assists the storekeeper to control the stock. For each material the maximum stocks to be held are noted on the card. Where the materials are of a kind requiring advance ordering, an ordering level is also indicated therein so that fresh supplies may be ordered before the minimum is reached.

These cards also provide an independent check on the stores ledger. In large organizations, the storekeeper also maintains 'store control cards' which are similar to bin cards and are kept by him close at hand. This obviates the difficulty of going to bins for obtaining the necessary information as and when required.

Stores ledger/ stock control card: This ledger is kept in the other department and is identical with the bin card except that the receipts, issues and balances are shown along with their money values. Stores ledger contains an account for each class of material and facilitates ascertainment of all details relating to the material in minimum time. It provides a continuous record of stores received and issued and discloses the balance in hand at any time both in quantity and value. It thus furnishes management with a perpetual inventory.

Stores Ledger Account												
Material Code: Bin No.: Material description: Location:					Maximum Quantity: Minimum Quantity: Ordered Quantity:							
Receipts					Issues				Balance			
Date	G.R. No. (Goods Receipt)	Qty	Price	Total Amount	S.R. No. (Stores Requisition Note No.)	Qty	Price	Total Amount	Qty	Price	Total Amount	Remarks

Difference between Bin card and store ledger

Bin Card		Stores Ledger	
1	Bin Card is not an accounting record	1	Stores ledger is the basic accounting record.
2	It is a record of quantity only	2	It is a record of both quantity and value
3	It is kept inside the stores	3	It is kept outside the stores
4	It is maintained by the storekeeper	4	It is maintained by the costing department
5	Each transaction is Individually posted	5	Transaction may be posted Periodically and in total.

Receipts and issues record

A receipt is a piece of paper or electronic document which confirms that the seller received payment from the purchaser. The receipt generally includes the date and description of the item which was sold by the seller and purchased by the buyer. There is a difference between invoice and receipt i.e., an invoice says 'please pay me' while a receipt says 'you have paid me'.

Issues record may be a register or loose leaf form. All the stores issued are entered date wise in issues record by store-keeper. These are useful to prepare the store ledger. Store ledger is prepared by accounts section with information available from the receipt and issue record.

Receipt				
DATE		RECEIPT NO.		
BILL TO		SHIP TO		
<Contact Name>		<Name / Dept>		
<Client Company Name>		<Client Company Name>		
<Address>		<Address>		
<Phone>		<Phone>		
<Email>				
DESCRIPTION		QTY	UNIT PRICE	TOTAL
				0.00
				0.00
			SUBTOTAL	0.00
Remarks, notes, payment made in cash/card/cheque			DISCOUNT	0.00
			SUBTOTAL LESS DISCOUNT	0.00
			TAX RATE	0.00%
			TOTAL TAX	0.00
			SHIPPING/HANDLING	0.00
			Balance Paid	
Company Signature		Client Signature		

Stock Verification refers to verification that the material is there as per the details, specifications and balance quantity as mentioned in the material register/record. It also means to match with the daily book balance with the actual physical balance of the material is called “Stock Verification”.

Stock verification form

S.No.	Item	Description	Condition	Remarks
Names and Designation				
1			Signature with date	
2			Signature with date	
3			Signature with date	

Spoilage and obsolescence record

Spoilage refers to the wastage or loss of material that occurs during the manufacturing process. It can also be used to classify badly damaged material that is used for processing a product. The term is most commonly applied to raw materials as they have a short life span, such as food used in a hotel. For example, a fruit importer understands that transporting fruits will definitely incur spoilage for various reasons.

Obsolete Records are the records which record the unused products/components. When a new product/component comes to the market, older product/component becomes less useful. The rapid change in the technology is one of the major factors to cause the obsolescence. The term obsolete inventory refers to the inventory that is at the end of its product lifecycle. This inventory has neither been sold nor used for a long period of time. It is not expected to be sold in the future. This type of inventory can cause large losses for a company. It has to be written-down or written-off. Obsolete inventory is also referred as dead inventory or excess inventory.

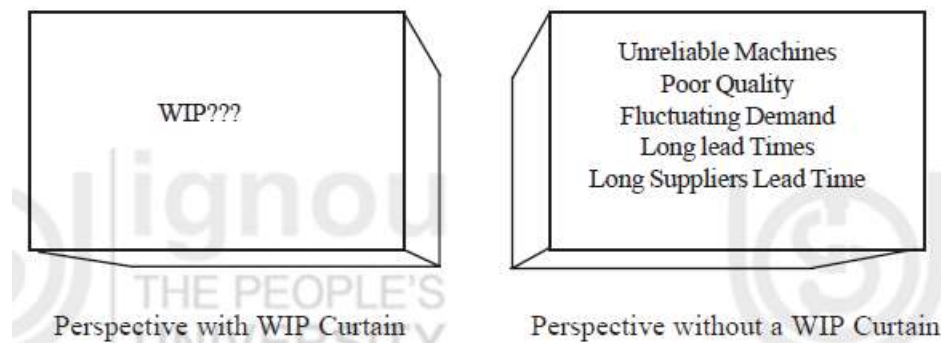
Spoilage Record						
Section		Date		Time		
S.No.	Item Description	Quantity	Unit	Unit Cost	Total Cost	Remarks

4.5. Factors that impact stock control levels

Manufacturers today face many challenges and are in continuous pursuit to improve the effectiveness of their operations and the quality of their products by creating ways to remain responsive and competitive in the marketplace. Four “Ws” of product: who, what, when and where to make and ship to satisfy customer requirements are crucial in production. A significant portion of a manufacturer’s financial resources are involved in inventories stored at various points in the supply chain. This is because of creating buffer demand and supply variability, including raw materials and work-in process (WIP) as well as finished goods.

It is necessary to pinpoint the factors and reasons for existence of WIP inventories. A flow process can be prepared to trace the flow of materials from the start to the finish. By this method you can find the delays that occur in the course of production process. If the materials are held up in the production process, then the other factor that could affect WIP could be storage space and the consequent storage costs and inventory carrying costs. There would be inventory-handling costs also that will go up as the material help up will have to be shifted to a temporary location and then shifted back into the line.

These costs are non-value added costs as far as the product is concerned but, are to borne by the customer. If the production process is halted, it results in delayed material lying on the production floor rather than getting converted into a finished product. This halts the cash flow of the organization and hence is non-beneficial for the organization. One must control WIP inventories by minimizing the overall production time.



The above figure reveals that WIP inventories hide many bottleneck of an organization. It acts as a protective buffer against the bottlenecks. So if an organization is facing problems like having unreliable machines, poor quality, having fluctuating demands and higher lead times, it is bound to maintain a high level of WIP inventories.

Factors that contribute for WIP inventories are as follows:

- These materials remain in the inventory as protective buffer against production breakdown or rejection.
- These materials remain in the inventory for economic lot production i.e. a larger quantity is sometimes produced than what is actually required.
- These materials remain in the inventory, as sometimes they have to wait for matching components and other materials for final assembly.
- These materials remain in the inventory due to the delay in the next stage of production.

An effective way to control WIP inventories is effective planning and coordination of production activities. The amount of WIP inventory is directly dependent on the length of the production cycle, the percentage of machine utilization and the management policy. The amount of WIP inventory depends on the type of production job. The table below summarizes the effects of different types of production jobs on the WIP inventories:

Page 51 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -II	Version -1
			September, 2022



S.No	Type of Production Jobs	Description	WIP inventory
1	<i>Flow Production</i>	Manufacture is continuous and proceeds as a balanced flow from one operations to another and one machine to another. No queuing between work centers.	WIP depends on the cycle time. Little scope for its reduction.
2	<i>Batch Production</i>	Quantity produced in a batch has to be stored for further use at a different time.	WIP inventory can be reduced substantially.
3	<i>Job Production</i>	Production is undertaken to meet specific customer demand.	WIP inventory is generally small.

Self-check 4	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below.

Test I: Choose the best answer

- Stored Purchased items or extracted materials that are converted via the manufacturing process into components and/or product are said to be_____?
 a) Finished goods inventory
 b) Work in process inventory
 c) Raw materials inventory
 d) Semi-finished materials inventory
- Inventory control system that allows study each item of stock in terms of its usage, lead time, technical or other problems and its relative money value is_____?
 a) Fixed stock level
 b) ABC analysis
 c) Reorder level
 d) Minimum stock
- A stock level below the minimum stock is said to be_____?
 a) Reorder level
 b) Danger level
 c) Reorder quantity
 d) Economic order quantity
- A method of warehouse recording that stores balances after each receipt and issues is said to be_____?
 a) ABC analysis
 b) Perpetual inventory system
 c) Economic order quantity
 d) Reorder level
- A warehouse material record which is placed outside the warehouse is called_____?
 a) Bin card
 b) Materials issuance
 c) Stores ledger
 d) Stock verification form

Test II- Provide Short answers

- Stores ledger is maintained in the
- Bin Card is a record of only.
- Bin Card is maintained by.....

d) Quantities of materials on hand as shown by bin cards should agree with quantities actually on

e) Define inventory control

.....
.....
.....
.....
.....

f) List the main objectives of inventory control

.....
.....
.....
.....
.....

Operation Sheet 4

Name.....

ID.....

Date.....

Time started: _____ Time finished: _____

Instructions: Given necessary information you are required to perform the following tasks within 1 hour. The project is expected from each student to do it.

1. Two components A and B are used as follows:

- Normal usage 50 per week each
- Minimum usage 25 per week each
- Maximum usage 75 per week each
- Re-order quantity A 300 B 500
- Re-order period A 4 to 6 weeks, B 2 to 4 weeks

Calculate for each component

a) Re-order level

b) Minimum level

c) Maximum level.

(Answer: A a) 450 units b) 200 units c) 650 units

B a) 300 units b) 150 units c) 750 units

2. Calculate economic ordering quantity from the following particulars:

- Annual usage 6,000 units
- Cost of material per unit is Birr. 20.00
- Cost of placing and receiving one order is Birr. 60.00
- Annual carrying cost of one unit is 10 percent of inventory value

(Answer 600 units)

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Page 57 of 60	Ministry of Labor and Skills Author/Copyright	Cooperative marketing Level -1	Version -1
			September, 2022

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