17

WAREHOUSE UTILIZATION MANAGEMENT

In the previous lesson, you learned about the warehouse organization structure and its roles and responsibilities. In this lesson we shall discuss warehouse utilization management (WUM) i.e., Study on emerging trends in the warehousing sector. Warehouses are a key component of the commodity supply chain, as well as a system for storing and distributing goods from production areas to consumers. In addition to saving time and money, modern technology is used in warehouses to handle goods efficiently. Mechanization and automation of agricultural produce storage systems is necessary to improve the handling and storage of agricultural produce. Different of stacking patterns are followed to keep packages on the warehouse floor.

We need to follow a standard operating procedure (SOP) for receipt / delivery of stocks to achieve customer satisfaction as effective customer service is the key to the business success. We need to switch from bag to bulk storage as soon as possible.

LEARNING OUTCOMES

After studying this lesson the learner:

- defines the status of warehousing utilization in warehouse management;
- identifies the services offered by warehouses;
- outlines the storage space planning in warehouse utilization management;
- relates the customer expectations in warehouse utilization management;
- lists the need for an improved storage system.

17.1 CHANGING AND EMERGING ROLE OF THE INDIAN WAREHOUSING INDUSTRY

1. Warehouses collect the goods; sort and distribute them as a part of supply chain activity. Logistics includes inventory planning, procurement of goods, warehousing, packaging, transportation, distribution and customer service. Therefore, Warehouse is a system to assist the storage activities of different goods on a small and large scale. This is done in a systematic and orderly manner.

2. India warehouse cater are primarily catering to the agriculture sector because of record food and grain production in the last few years. The introduction of the Goods and Services Tax Regime in 2017 and the grant of the status of "infrastructure" to the logistics industry are the most significant factors in the growth of the warehousing industry in India

3. As per the recommendations of the Rural Credit Survey Committee (1954), the parliament of India passed a bill named Agricultural Produce (Development and Warehousing) Corporations Act, 1956, for setting up warehousing in the public sector and introduction of a three-tier structure consisting of Central Warehousing Corporation (CWC) for markets of national importance, State Warehousing Corporations (SWC) for state markets and cooperatives to take care of local or village markets.

4. In recent times, the introduction of Gramin Bhandaran Yojna has given the necessary push to the growth and development of agri-warehousing. This is not only in the government sector but also in the private sector. The government support to the Private Sector and Cooperatives helped create warehousing capacity across the country.

5. Various reform initiatives of the Government encouraging participation of the private sector in the creation of warehousing infrastructure helped achieve significant growth in warehousing capacity, in the post-independence period.

6. Besides agriculture, the manufacturing sector is amongst the major users of warehouse space. To aid manufacturing and warehousing sectors, the government plans to set up multimodal logistics parks at an investment of Rs 2 trillion at 34 locations across India, which is likely to have the highest freight movement.

7. Initiatives like the Make in India program, multimodal logistics parks, and infrastructural push, would together lead to a rise in development for existing warehouse space. In addition, there would be an increase in demand for existing warehouses.

8. Further, the current set of players would invest in capacity expansion, once the existing

capacity utilization of the manufacturing industry in India, which is poised around 70%, reaches at least 80–85%. Once that level of capacity utilization is crossed, the industry may witness the movement for next investment cycle.

17.1.1 Key Emerging Trends in Warehousing

India is still behind major economies in terms of per capita warehousing space but it is now growing faster than earlier to provide a necessary boost to our economy as briefed below-

- Gradual shift in industry structure from fragmented and unorganized players to large organized players.
- Increasing institutional investor participation and the entry of foreign players in the sector.
- Consolidation of warehouses from a large number of small facilities to a few larger centers.
- Reduction in inventory carrying costs for major companies.
- Implementation of automation and smart warehouse solutions in warehouse operations.
- Makeover of warehouses to provide storage andvalue added services.

17.2 SERVICES OFFERED BY WAREHOUSES

Warehousing, a key component of the commodity supply chain, comprises the facilities and systems which add value to the products. This is done by providing efficient storage and distribution of goods from the production areas to the consumers. The requirement for warehousing starts at the point of production or procurement of raw materials and when it reaches the door of customers.

Warehouses are used to store goods in a systematic and orderly manner. They protect goods against fire, flood, cyclone, storm, heat, moisture, etc. and also cut down losses due to damages. In addition to this, warehouses nowadays also render a variety of many other services. Ultimately, the use of warehousing in a business activity strengthens its overall economy. The following are the common services offered by warehouses:

A. **Storage of Surpluses and Scientific prevention-** Warehouse provides services for inventory management and acts as a balancing place for supply and demand of various goods by providing facilities for storage of seasonal products, to make their availability all-round the year or safely keeping goods produced in bulk in industries and arrange supply of the same to the consumption areas in the required time and place.

B. **Risk management –** Being a bailee of goods as per the law like the Indian Contracts

Act, the warehouses accept the responsibility of risks incidental to the storage of goods and to return these goods in good condition.

C. **Consolidation –** Producers having small quantities of lots who need to ship a larger consignment to a destination to meet the ordered quantity use the warehousing services for consolidation to gather the required quantity of goods.

D. **Traceability –** In order to track the movement of goods stored in a warehouse technology like Bar-coding or RFID (Radio Frequency Identification Devices) tagging etc. While a Bar code may contain key information about the goods deposited, the RFID tagging is a system that is capable of holding a large amount of information about the product and its further movements.

E. **Pledge Financing-** When goods are deposited in any warehouse the depositor gets a warehouse receipt, which acts as a token of the deposit of goods. The warehouses registered with WDRA can also issue a Negotiable Warehouse Receipt (NWR) in favour of the owner of the goods.

> Warehousing allows for timely delivery and optimized distribution, leading to increased labor productivity and greater customer satisfaction

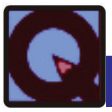
F. **Easy handling-** Modern warehouses are generally fitted with mechanical appliances to handle the goods.

G. **Transportation-** The warehouse does provide transport arrangements to the bulk depositors if so required, by collecting the goods from the place of production and sending goods to the place of delivery.

H. **Reverse Logistics –** It is the process of moving goods from their typical final destination back to the warehouse, to capture value, for recycling, proper disposal or for remanufacturing. It is a part of handling customer complaints by either returning the cost to them or making further improvements in the products.

I. **Clearing and Forwarding -** Clearing and forwarding involves two service providers, namely the clearing agent and the freight forwarder, which provide a service, on behalf of an importer or exporter, with the physical movement (logistics) and legalities (customs) concerning customs clearance in importing or exporting goods from one country to another. The transfer of goods can be easily done to the buyer by transferring the warehouse receipt.

J. **Economic services–**Small businessmen by paying nominal warehousing charges can preserve their raw materials as well as finished products in public warehouses, which saves them from the burden of constructing their own warehouses at a heavy cost.



INTEXT QUESTIONS 17.1

1. What is the full form of FMCG?
2. Select which of the following is incorrect-
   i. The warehousing industry is getting better organized due to increasing institutional investor participation.
   ii. We do not require warehousing as goods can be shifted directly to the user.
   iii. Warehouses provide value addition to goods.
   iv. Warehouses are an important component of the logistics industry.
3. What is an RFID system?
4. What is the basic function of warehouses

17.3 MATERIAL HANDLING AND STORAGE SYSTEMS

Manual handling of goods is having various issues like inefficiency, inordinate delay in operations besides scope for higher handling losses. The modern warehouses have got better technology options particularly in the packaging and handling system , which can be integrated with warehouse operations for better efficiency as briefed below-

A. Packaging - Automated packing, strapping and wrapping solutions make the stored packages of uniform size to achieve best space utilisation and also fit well with the lifting devices for easy handling. Palletisation of the packages is another good option in the efficient handling of the goods.

B. Material handling options– Equipment like, trolleys, forklifts, hand pallet trucks, mobile bag stackers etc. are helpful in securely lifting even heavy packages and stacking them at the desired position. Computer monitored automated stackers are also available for the modern warehouses. Similarly dock levellers are used for proper placement of loaded trucks / empty trucks for receipt/ delivery of stocks, along with the warehouse plinth, at the door point to avoid spillages falling on the ground.

> Warehouses provide the equipment and supplies you need to Store, Move, and Package and Process orders from customers

C. Transportation- Variety of transport systems like bulk handling carriers, reefer vans/ trucks, temperature-controlled vans/trucks, container carriers, trailers are available today which are fully integrated with a multimodal transport system to ensure the safety of goods moving from the warehouses. Computer-aided vehicle tracking and monitoring systems ensure timely delivery of goods from the warehouse to various

destinations. Automatic Guided Vehicle System (AGVS) and Radio Frequency Data Terminals (RFDT) are some of the technological tools, which help in vehicle tracking and monitoring.

INTEXT QUESTIONS 17.2

1. What is the full form of RFDT?

2. What is the full form of AGVS?

17.4 USE OF TECHNOLOGY IN WAREHOUSE MANAGEMENT

The success of any industry largely depends on the efficiency with which it identifies and adopts new emerging technologies. The technology options help in simplifying the processes by putting in place a flexible operating system with simplified and smooth handling and operating processes. With reduced manual intervention, chances of operational failures are minimised with an overall increase in the efficiency levels. Judicious use of technology also helps in the reduction of operational expenses.

17.4.1 Mechanization and Automation of Handling and Storage System

Mechanization and automation of agricultural produce storage systems is necessary to bring in efficiency in handling and storage of agricultural produce during different pre-warehousing/post warehousing stages as well as during storage. Substantial degree of mechanization and automation has been integrated with a warehouse over the past years. The process starts from the farm level to the warehouse system/infrastructure involving innovative material handling and storage, retrieval, and systems.

A. Technologies at the farm level – Farm-level management of agricultural produce is the beginning of preparing the produce for long term warehousing. This begins with cleaning/grading machinery along with facilities for testing of the quality, weighing facilities, bagging systems and loading/ unloading arrangements. Horticultural produce and other perishable products also require pre-cooling systems and pack-houses for conditioning the produce to pass through refrigerated transport and cold storage. Farm-level small capacity transport systems also play a major role in the safe and secure movement to the warehouses.

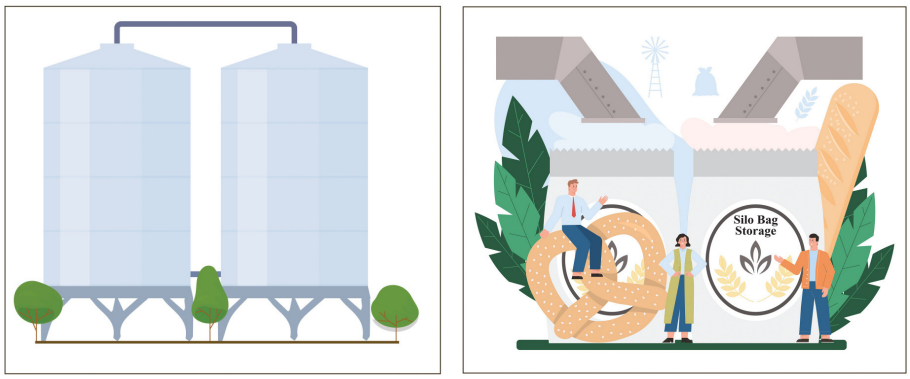
B. Warehousing systems –Different types of agri-produce warehouse systems are briefed as under:

a. Conventional warehouses – These are the most common type of warehouses

in the form of godowns used for storing dry produce under ambient conditions in bags. There are many innovations introduced in these warehouses viz. use of translucent roof sheets for better illumination, use of self-supporting truss-less roofing, use of pre-painted, poly-coated galvalume sheets in place of asbestos sheets, automated doors, turbo ventilators on the rooftop, solar rooftop panels etc.

b. Pre-Engineered Buildings (PEBs) – These kinds of warehouses are structures engineered in a factory and assembled at the site of the unit. These are generally steel structures assembled with bolted connections.

c. Silo – These are bulk storage structures in the form of vertical or horizontal storage structures made of steel or concrete in different shapes. (***Fig. 17.1 (a)***)



(a): Steel Silo ***(b):*** Silo bag

Fig. 17.1: Mechanization and automation of handling and storage system

d. Silo Bag Storage - This is hermetic storage in the form of the tubular underground airtight bag from which most oxygen is expelled by the bagging machine during the grain filling process, increasing pressure and compaction (***Fig. 17.1 (b)***) Once the bag is sealed, no oxygen will come inside, and temperature will not rise. The breathing process of grains, microorganisms, and insects consume the remaining Oxygen (O_2) and generate Carbon Dioxide (CO_2). This creates a Modified Atmosphere which stops the metabolic process of grains and inhibits the growth and development of moulds & insects, creating a naturally safe environment for storage.

e. Vacuum processed storage (VPS) – Grains are filled in airtight big sized sacks from which air is sucked out and sealed. A vacuum is created inside which would ensure a longer shelf life of grains and help easy handling and storage of these vacuum packs at any place.

17.4.2 Warehouse Infrastructure

Apart from the technological innovations in warehouse structure, there are many systems

wherein new technology has the potential to bring in higher efficiency. These may be briefly discussed as under:

A. Safety and security – Conventionally a boundary wall, proper entry gate, godowns with stronger doors with good locking system and a team of security guards constitute the warehouse security system. However, CCTV surveillance is gaining popularity as it provides a view of multi-locations in the premises even on the mobile phone with a system of alert for any unauthorised entry. There are also gazettes in the form of smart cards, fingerprint readers, iris scanners etc. which allow entry to only authorised persons in the warehouse premises. Technologies are also available to track the visitors' movements in premises based on the chip-enabled visitor badges. Smart night lighting arrangement in the premises also helps in night surveillance.

B. Infrastructure for weighment: – Generally the bigger warehouses have a weighbridge which may be mechanical or electronic, whereas smaller warehouses possess platform scales (mechanical or digital) of reasonable capacity. Now technology options are available to integrate the weighbridges or platform scales with the computerised operational management application of the warehouse.

C. Fire Safety – Technology applications for fire safety involve fire hydrant/sprinkler system, smoke detection technology and fire alarm system.

D. Quality testing technology – Automation of quality testing technology includes the use of auto samplers, a variety of electronic moisture metres, automated systems for testing physical quality (using image scanning technology) and chemical parameters of the quality of agricultural produce in the warehouses.

E. Preservation technologies – there are innovative tools for automated pesticide application and safety systems, phosphine generators and application systems for large scale grain fumigation and fumigant auto monitors which greatly improve the efficiency and effectiveness of various treatments to preserve the stock during warehousing.

INTEXT QUESTIONS 17.3

1. Mechanisation and automation of handling and storage system of agricultural produce is necessary to (choose correct options)

   a. increase efficiency b. reduce wastages

   c. operational failures d. high expenses

17.5 STACKING AND SPACE UTILISATION

A. Types of stacking

There are different types of stacking patterns followed to keep the packaging on the warehouse floor or in rakes. Stacking on the floor is carried out in the following three ways:

a. **Simple stacking** – In this stacking the packages are vertically piled one above the other up to a limited height of approximately 10 units. This type of stacking is not very stable and is used only during transshipment operations. A simple stack of a fixed height helps in easy reconciliation of the quantity unloaded and transshipped.

b. **Criss Cross stacking** – Used for stacking bigger lots with a longer storage duration. In this type of stacking orientation bags in different layers is alternated to create a strong holding of the packages as illustrated in the (**Fig.3**)

c. **Block stacking** – In this type of stacking stack, the base is divided into many blocks as per the size of packaging and dimension of the stack-based. In each block, a different pattern and orientation of packages are adopted which keeps alternated in each layer within the block. This creates smaller sub stacks within the stack which are quite stable. This system is followed in the warehouses when the size of the lots is smaller.

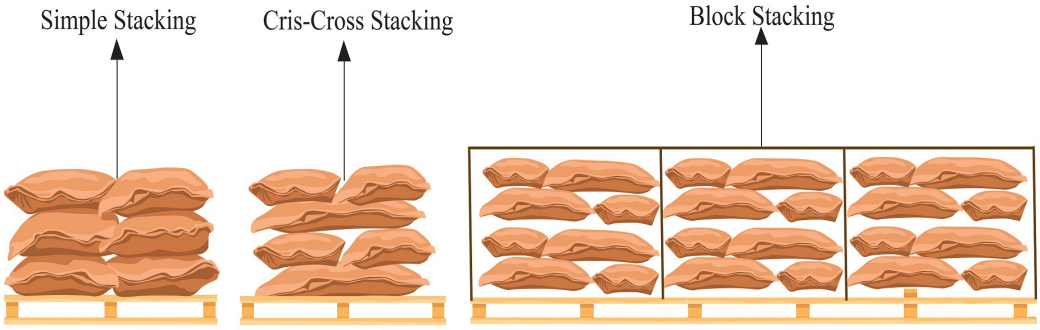


Fig. 17.2: **Different types of stacking followed in a warehouse**

B. Stack planning

a. **Size of stacks –** Size of stack is decided based on the package size, godown dimensions and requirement of space for various operations like handling the stock, carrying out monitoring/inspection and undertaking various treatments/fumigation etc.

b. **Drawing up a stack plan –** A stacking plan is the drawing of the godown floor on a piece of paper and dividing it into rectangular or square blocks having dimensions into multiples of the packing size. For example, the packing size of $3^{1}x2^{1}$ may fit in a

stack size of 30'x20' or 15'x10' or even 12'x8'. It is also required to leave a space of 2.5 feet between stacks called alleyways and an operation passage of 4 feet touching all the stacks and connecting the door points. Care is also to be taken to ensure that pillars and other obstructions don't come in the middle of the stack to obstruct putting up fumigation covers on the stack. The ultimate idea is to cover maximum stock with these requirements in the godown. On the floor also stack lines are to be neatly drawn (5 cm wide) with a prominent colour and the serial number of each stack inscribed on each stack base.

c. **Stack height –** The stack height is based on the shape and dimensions of the packing, weight of the packed goods, load-bearing capacity of the commodity and the floor. Maximum stack heights of some of the important commodities are given in ***Table 17.1*** as under:

Table 17.1: **Maximum stack heights of some of the important commodities**

No.	Commodity	Maximum Stack Height	
		In Metres	In Feet
CEREALS			
1.	Wheat, Barley, Paddy, Jowar, Wheat Bran	4.6	15
2.	Whole Pulses, Maize, Rice	3	10
3.	Rice Bran (In dry condition)	3.0 – 3.7	10-12
MILLED PRODUCTS			
4.	Milled Pulses, Sooji, Maida, Besan, Wheat Atta	4.2	14
OILS & OILSEEDS			
5.	Oils tins (4-gallon tin)	3.4	8
6.	Oil drums	2.1	7
7.	Cumin seed	4.6	15
8.	Oilseeds & oil cakes, Arecanut, Cashew pods, Coffee pods	3.7-4.3	12-14
9.	Groundnut kernels, cashew nut Kernels	3-3.7	10-12

17.6 PROCEDURE IN RECEIPT AND DELIVERY OF STOCKS

A. Steps involved in depositing goods in warehouse

A comprehensive list of activities has been proposed by WDRA for receiving goods for the purpose of storage in a warehouse. Flow chart (***Fig. 17.3***) depicts the procedure. Step wise procedure is as under:

- Submission of Deposit Application
- Entry of loaded vehicles in the premises after making entries in gate Register
- Weighment of the stocks
- Assayingthe quality of the stocks
- Unloading of stocks from the transport vehicle into the godown.
- Stacking of stocks in the godown
- Preparation of necessary records
- Issuance of a negotiable warehouse receipt or non- negotiable warehouse receipt as the case may be.
- Completion of the entries in the Office Record

B. Steps involved in the delivery of goods

The stocks shall be delivered to the depositors or his authorised representative on his request as per the following procedure:

- Depositor/eNWR holder requests for delivery of stock to the warehouse in charge who authorises delivery of the stock after due verification.
- Verification of documents/ records, particularly the warehouse receipt is done in the office. Warehouse rental and other charges assessed and depositors informed about the same.
- Inspection of the quality of the stocks.
- Collection of storage, insurance and other charges.
- Issuance of the delivery order to the Godown in charge.
- The entry of the empty vehicles in the warehouse premises.
- Weighment of the empty vehicles, if required.
- Placement of empty vehicles at the gate of the godowns for loading.
- Weighment of the loaded vehicles.

- The endorsement in the warehouse receipt in the event of partial delivery or its surrender to the warehouse in charge in the event of full delivery of covered goods.
- Preparation of the gate pass.
- The exit of the loaded vehicles, after weighing, if required.
- Preparation of the records and making entries in the Godown/office registers.

Fig. 17.3: **Flow chart of receipt/ delivery operations**

C. Weighing during delivery

The same mode of weighment shall be resorted both during the deposit and delivery of goods in a warehouse to avoid instrumental error.

D. Quality assessment during delivery

i. Before delivery of deposited goods to the depositor or its authorised representative the representative sample of stocks shall be drawn and tested for its quality, moisture, infestation if any, and grade.

ii. The observations shall be recorded in relevant records and be authenticated by the depositor, its authorised representative, or the electronic negotiable warehouse receipt holder.

E. Transfer of stocks

Transfer of stocks from one depositor to the other by endorsement can also be done in case of a negotiable warehouse receipt but it shall require the consent from both the parties. Re-assaying of the quality of the stocks can be carried out if so desired by the endorsee.

INTEXT QUESTIONS 17.4

1. List 3 factors which influence stack height.
2. Which document will have to be shown to the security staff at the time of delivery?
3. The warehouse receipt must be surrendered at the time of partial delivery (true/ false)

17.7 CHANGING CUSTOMER PERCEPTION AND COMPETITION

Customer perception is the opinion formed about a product, brand or services offered by the customers. Customers are typically the brand ambassadors of the product or services offered to them, that is why they are key to the success of the business. In today's competitive world, it is always important to provide best services second to none for survival of any business. Customers always expect to be given VIP treatment at all times, which can in turn help the business operator to maintain its brand image and higher turnover. It must be remembered that the type of customer service experience by the customers will lead to adoption of the brand as a part of their lifestyle, and facilitate the regular usage of the services and products. A satisfied and happy customer always

adds value to the brand, and helps in retaining the business in the competitive situation ahead of all competitors.

How to improve customers' perception

- Identify the needs and requirements of your customers.
- Always develop effective communication to understand customer's perceptions.
- Obtain constant feedback and devise methods to improve services.
- Never compromise with quality of services for petty gains.
- Share customer endorsement with other prospective customers.

17.8 NEED FOR BAG TO BULK STORAGE OF GRAINS

"A grain saved is grain produced" is in the best interest of mankind as it is only a measure for providing food security. It is however very painful to know about the huge quantum of post-harvest losses of agricultural produce due to poor storage practices at different levels. The reason for such huge post-harvest losses mainly attributed to lack of scientific storage facilities, inefficient transportation system, and poor warehousing infrastructure, such as inadequate warehousing facilities and farmers' inaccessibility to value-added services.

The Government of India has finalised the National Policy on handling, storage and transportation of food grains in June 2000, to involve efforts and resources of public as well as private sectors, both domestic and foreign, to build and operate infrastructure for bulk handling. This system is a modern technology of automated / mechanised storage and handling of grains, which has the potential to substantially decrease post-harvest wastages. Most of the countries except a few Asian countries are already using bulk storage and handling to save grain losses. Even China has switched from bag to bulk long back.

Bulk storage or modern storage has advantages over bag storage, as follows:

- Low running costs;
- Low labour requirements;
- Efficient handling;
- Reduction in loss due to spillages and rodents
- Lesser consumption of pesticides
- Efficient and effective fumigation operation;
- Less land area requirement;
- Complete control of aeration;

- Safe storage of the grain for longer periods;
- Mechanisation of all operations;
- Lesser risk to manpower.

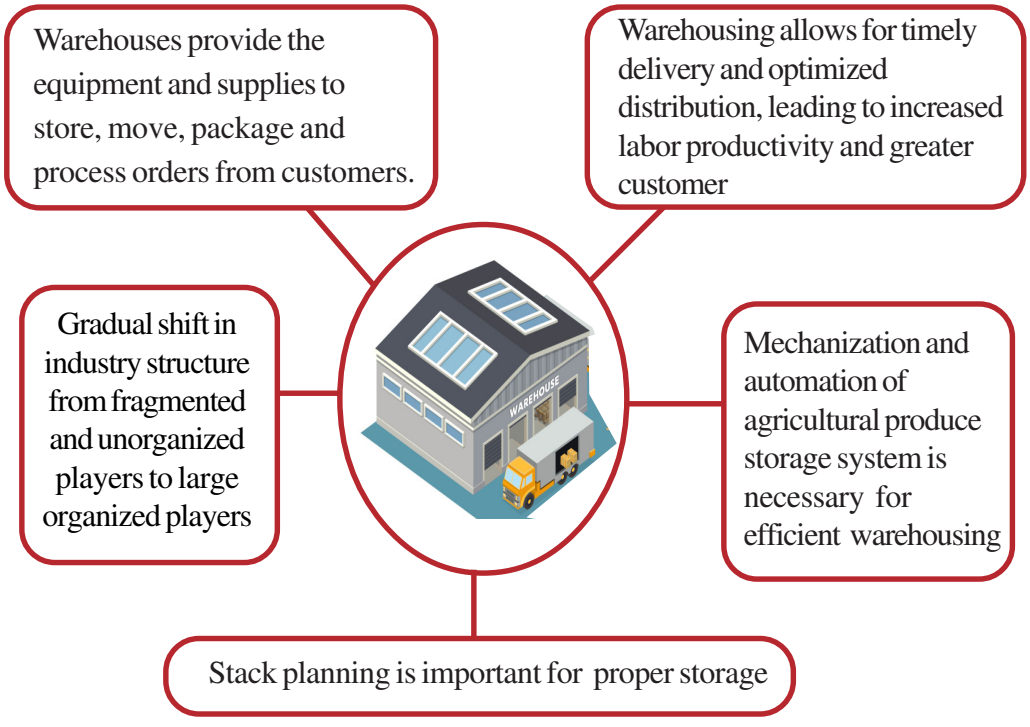
Various studies have demonstrated that in the long run, bulk storage is very economical and an effective method to reduce post-harvest wastages.

INTEXT QUESTIONS 17.5

STATE TRUE/ FALSE

1. A satisfied and happy customer always adds value to the brand, and helps in retaining the business in the competitive situation ahead of all competitors.
2. Always develop effective communication to understand customer's perceptions.
3. In bulk storage we need more space for making a unit.
4. Bag storage is good for India as we have lot of labour to handle it

WHAT YOU HAVE LEARNT



KEY TERMS

Agriculture sector	Customer satisfaction
Fast-Moving Consumer Goods	Foreign direct investment
Grading	Mechanisation
Pledge Financing	Reverse Logistics
Risk management	Silobag,
Stacking	Stack pla

TERMINAL EXERCISE

1. What is the benefit of quality description in the negotiable warehouse receipt?
2. Who authorises delivery of the stock to the depositor?
3. Why should the same mode of weighment be resorted both during the deposit and delivery of goods?
4. Which type of stacking is done in case of small lots?
5. How can warehouses facilitate the sale of goods?
6. How has the warehousing industry evolved in India over years?
7. What are the different arrangements made by the Government to promote warehousing infrastructure in India under public and private sectors over years?
8. Write a short note on Key emerging trends in warehousing.
9. The warehouse acts as a bailee of goods. Please comment.
10. Write a short note on safety of warehouses.
11. Please elaborate how warehousing acts as a key component of the commodity supply chain? What are new trends in warehousing to make it look more attractive to customers?
12. Discuss the procedure of receipt and delivery of goods in the warehouse? Why it is

important to have quality assessment and weighment at the time of receipt and delivery of stocks.

13. What is stack planning and why is it important in warehouse operations? Discuss different types of stacking patterns, What is the need for automation and mechanisation in the warehouse?

14. What methods are used in this direction? How technology helps in increasing efficiency in warehouse operations.

15. Warehousing provides a variety of services. Discuss in detail.

ANSWERS TO INTEXT QUESTIONS

17.1

1. Fast-Moving Consumer Goods.

2. **i**

3. RFID tagging is a system which is capable of holding a large amount of information about the product and its further movements

4. The basic function of warehouses is to preserve goods on a large-scale in a systematic and orderly manner

17.2

1. Radio Frequency Data Terminals

2. Automatic Guided Vehicle System

17.3

1. a . b

17.4

1. The shape and dimensions of the packing, weight of the packed goods, and load-bearing capacity of the floor.

2. Gate pass

3. False

17.5

1. True
2. True
3. False
4. False

DO AND LEARN

Setting up a new warehouse is to be done. What type of requirements you feel are necessary in terms of infrastructure and build a mechanised modern warehouse for agri commodities.