# Modernizing Warehouses with odoo ERP

Understanding the Evolving Landscape of Warehouse Operations & Tech Integration with Odoo



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In 2025, warehousing is not just about storing goods—it's about efficiency, automation, and data-driven precision. This whitepaper explores the evolving types of warehouses, the technologies powering them, and how platforms like Odoo ERP can support scalable digital transformation.

#### **Backbone of Modern Warehouses**

To remain competitive, modern warehouses must implement a foundation of smart technologies. Core systems such as **lot and serial number** tracking, **RFID**, warehouse management systems (**WMS**), and **loT sensors** ensure accurate, efficient operations. As warehousing needs scale, advanced technologies like autonomous mobile robots (**AMRs**), **vertical storage systems**, and **augmented/virtual reality** become essential for speed, accuracy, and adaptability.

#### Warehouse Models & the Right Technology

Different warehouse models require different tech stacks. Basic warehouses may rely on manual tracking and basic inventory tools, while **fulfillment centers** and cold storage facilities demand greater automation, environmental control, and order accuracy. At the high end, fully automated and **smart warehouses** leverage **Al, robotics**, and **predictive systems**—each technology playing a specific role depending on the warehouse's purpose and complexity.

#### Statistic of warehouses and Odoo database

30%

about 30% of all active Odoo databases use inventory module

60%

of Odoo databases that using Inventory module have product with Lot/Serial number tracking

#### The Role of Odoo ERP in Enabling Warehouse Transformation

Odoo's modular ERP platform is built for flexibility, making it an effective backbone for a range of warehouse setups. It supports key features such as lot/serial number control, expiration date tracking, barcode scanning, and can be extended with custom RFID and loT integrations. Whether you're running a basic stockroom or building a smart logistics network, Odoo can scale with your needs.



# Introduction

#### Reimagining Warehousing for the Digital Era

Warehousing is no longer a static function of logistics—it is a dynamic, tech-driven engine at the heart of supply chain innovation. As customer expectations increase and product lifecycles shorten, warehouse operations must evolve beyond traditional models to meet the demands of speed, accuracy, and scalability.

#### Your warehouse matters

Modern warehouses are shifting from manual storage hubs to smart ecosystems that rely on real-time data, automation, and intelligent systems. Understanding this transformation is vital for businesses that want to stay competitive in 2025 and beyond. With technology adoption accelerating, companies that fail to modernize risk inefficiencies, missed opportunities, and growing operational costs.

### This whitepaper provides

- An overview of the most relevant warehouse models shaping logistics in 2025.
- A breakdown of critical technologies—from lot tracking to robotics and IoT—that drive warehouse efficiency.
- A comparative matrix showing how different warehouse models align with specific tech tools.
- An evaluation of Odoo ERP's feasibility in supporting each type through modular, customizable features.



#### Strategic insights

- Choosing the right technology stack based on warehouse models.
- Identifying gaps in current operations.
- Planning future-ready warehouse implementations using Odoo and beyond.



# Transformative Warehouse Technologies

As warehouses evolve from manual operations to digitally driven ecosystems, technology has become the cornerstone of efficiency, accuracy, and scalability.

This section introduces the core technologies shaping modern warehousing—each playing a critical role in streamlining operations, enhancing visibility, and enabling intelligent automation. From foundational systems to advanced innovations, these tools are transforming how warehouses function in 2025 and beyond.







# **Basic Warehouse technology**

# Lot Number and Serial Number Tracking

This is the foundational layer for inventory control and traceability.

It doesn't heavily rely on other advanced technologies for initial implementation.

#### **Key Functions**

- Product Traceability Track products from inbound to outbound
- Recall Management Identify and isolate affected items quickly
- Inventory Accuracy Prevent duplication, misplacement, or mismatching
- Shelf-Life & Expiry Monitoring Especially critical for food and pharma
- Compliance & Audit Readiness Meet industry regulations with full transparency

#### **Benefits**

- Reduces recall costs by isolating only the affected batches or units
- Improves inventory accuracy across storage, picking, and shipping
- Ensures regulatory compliance in sensitive industries (e.g., pharma, food)
- Supports high-value item tracking to prevent loss or theft
- Saves time in audits by automating traceability and documentation

# Pharmaceutical companies (e.g; Pfizer, Johnson & Johnson).

Pharmaceutical companies like Pfizer use lot and serial tracking to ensure safety, manage recalls, and comply with strict health regulations.

- Lot numbers allow Pfizer to trace batches of medication in case of quality issues or regulatory audits.
- Serial numbers are used to track each vial or package individually especially for high-value or controlled drugs—ensuring accurate distribution and preventing counterfeiting.

#### **Feasibility in Odoo Enterprise**

 Odoo supports both lot number and serial number tracking directly in its inventory module. Users can enable tracking per product, generate IDs automatically, and integrate these with barcodes, expiration dates, and reporting for full traceability.



### Intermediates Warehouse technology

# RFID (Radio-Frequency Identification)

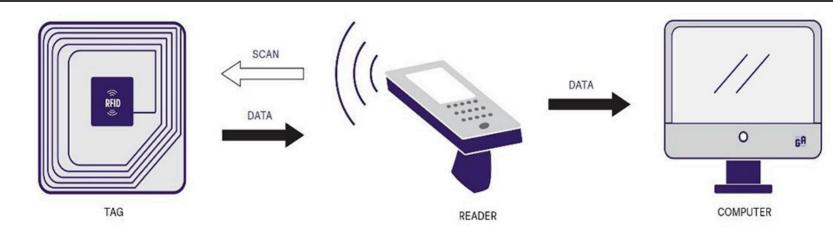
"RFID enables seamless, real-time tracking of inventory no line-of-sight scanning required."

### **Key Functions of RFID**

- Automated Inventory Updates
- Fast Receiving & Putaway
- Real-Time Location Tracking
- Batch & Pallet Scanning Without
   Manual Input
- Reduced Manual Errors

#### **Benefits**

- Up to 80% faster inventory counts
- Enhanced picking speed and accuracy
- Real-time visibility across the warehouse
- Reduced labor dependency for scanning



#### **How RFID Works**

- 1. Put RFID Tags on Items
- 2. Readers Detect Tags Automatically
- 3. System Updates Inventory in Real-Time

### **Retailers** (Zara, H&M)

Retailers like Zara or H&M attach RFID tags to all items, enabling fast scanning of racks, reducing out-of-stock incidents, and streamlining fulfillment operations



Odoo (v18+) supports RFID integration through barcode modules and custom device connectivity—extending automation from system to shelf.





# WMS (Warehouse Management System)

A WMS is the digital backbone of modern warehouse operations—streamlining processes, reducing errors, and enabling real-time control.

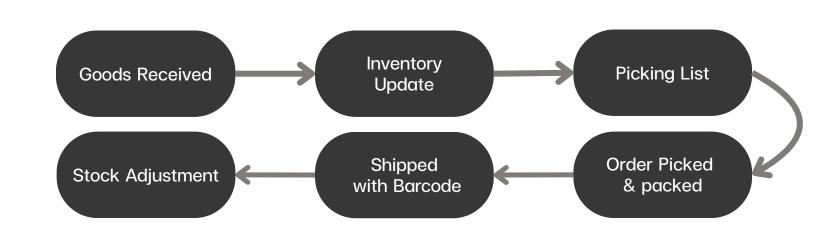
#### **Core Functions**

- **a** Inventory Control
- Real-Time Tracking
- Picking & Packing Management
- Receiving & Shipping Coordination
- Reporting & Forecasting
- Workflow Automation

#### **Amazon**

commerce giant Amazon uses an advanced WMS to orchestrate every step in its high-volume fulfillment centers—from receiving to optimized storage, picking, packing, and shipping.

The system provides real-time visibility of millions of SKUs, automates workflows, minimizes errors, and ensures ultra-fast delivery times.



#### **Benefits of WMS**

- Name 
  Reduced picking errors by 60%
- Improved inventory accuracy up to 99%
- Lower operational costs through automation

### Feasibility in OCOO

"Odoo's Inventory module acts as a WMS with real-time dashboards, barcode support, and flexible workflow configurations tailored to any warehouse setup."



### Intermediates Warehouse technology

# **IoT (Internet of Things)**

loT connects physical devices to your warehouse system—enabling real-time data, automation, and smarter decisions.

# Large-scale food distributors (e.g; Sysco)

Sensors on shelves, vehicles, or goods
Devices send data (temperature, weight, location)
WMS or ERP processes and reacts in real time

#### **Common IoT Applications in Warehousing**

- Environmental Monitoring (Temp/Humidity)
- Smart Scales for Auto-Weighing
- Real-Time Asset & Vehicle Tracking
- Condition Alerts (e.g., tampering, spoilage)
- Predictive Maintenance on Equipment



### **Data monitoring (Sysco)**

(d) Companies like Sysco use IoT sensors in refrigerated warehouses and trucks to monitor temperature and humidity.

⚠ If conditions fall outside safe ranges, alerts are triggered instantly—ensuring compliance with food safety regulations and reducing product loss.

### Feasibility in Odoo

"Odoo supports IoT integration via its physical and virtual IoT Box enabling real-time device data input from weight scales, barcode readers, sensors, and more."





### Intermediates Warehouse technology

# **Vertical Storage Solutions**

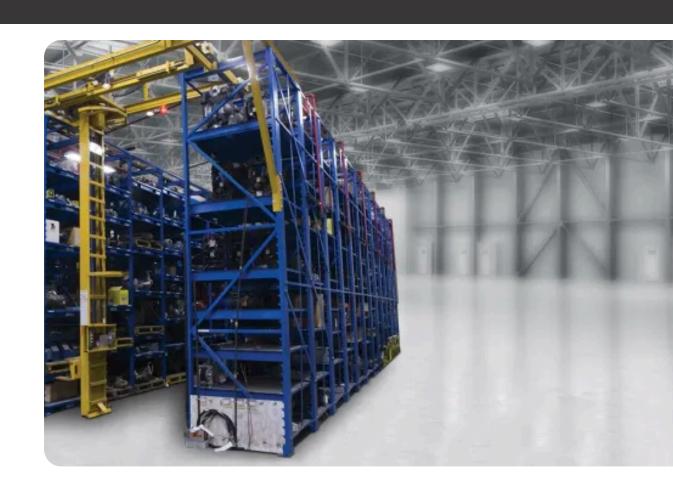
"Vertical storage systems increase warehouse capacity and picking accuracy—without needing more floor space."

#### **Benefits**

- Up to 80% space savings
- Higher picking accuracy & security
- Reduced retrieval time
- Improved ergonomics and safety for workers

#### **Types of Vertical Storage Systems**

- 1. Vertical Lift Modules (VLMs)
- 2. Automated Storage and Retrieval Systems (AS/RS)
- 3. Multi-tier Racking Systems
- 4.Pick-to-Light Vertical Racks



#### **Vertical Storage in Action**

- Automotive parts suppliers like Bosch use vertical lift modules to store thousands of small parts in compact footprints.
- These systems bring items directly to the operator, improving efficiency, minimizing retrieval errors, and securing high-value components.

#### **How It Works**

- 1. Products stored in tall, multi-level shelving or automated lift systems
- 2. Items retrieved automatically or by guided operator systems
- 3. System integrates with WMS for optimized slotting & retrieval

### Feasibility in odoo

The use of locations and sub-locations within Odoo to act as storage and shelf within the physical warehouses.







#### **AMRs & AGVs**

"AMRs and AGVs automate internal transport—boosting efficiency, safety, and scalability in high-volume warehouses."

#### What's the Difference?

#### **AMRs (Autonomous Mobile Robots)**

- Navigate dynamic environments using sensors & Al
- Adaptive paths, ideal for modern, flexible operations

#### **AGVs (Automated Guided Vehicles)**

- Follow fixed routes (magnets, tape, or tracks)
- Best for predictable, structured workflows

#### **AMRs/AGVs in Action**

Retailers like Zalando use AMRs to automate picking and delivery of items within massive e-commerce warehouses.

Robots travel warehouse floors efficiently, reducing labor needs and improving accuracy—especially during high-volume periods.

#### **Benefits**

Goods-to-Person Picking - Robots bring shelves/items to human stations Order Transport - Move packed orders to shipping zones Putaway & Sorting - Transport inbound inventory to storage Return Handling - Automate reverse logistics processes

# Feasibility in odoo

"Odoo does not natively support AMR/AGV automation, but its warehouse workflows and routing logic can be configured to coordinate with robotic systems through custom integrations or API-based middleware."



### **Advance Warehouse technology**

# **Augmented Reality and Virtual Reality**

Augmented and Virtual Reality are transforming warehouse operations from real-time guidance to immersive staff training



#### **VR (Virtual Reality)**

- Fully immersive digital simulation Used for training,
- layout planning, and safety drills

#### **AR (Augmented Reality)**

- Overlays digital info onto real-world view
- Used for picking guidance, item locations, and error alerts

#### **AR/VR in Action**

Companies like DHL use AR smart glasses to guide pickers with visual item locations, reducing search time and errors VR is also used to train staff in simulated environments before they step onto the warehouse floor—boosting safety an confidence.



#### **Applications in Warehousing**

- AR Picking Assistance Visual cues guide operators to items
- Live Order Info Overlay Display real-time data through smart glasses
- VR Staff Training Immersive onboarding in a simulated warehouse
- Layout Simulation VR mockups for facility design and testing
- Faster and more accurate picking
- Reduced onboarding time
- Improved learning retention
- Design errors reduced before implementation

## Feasibility in odoo

"AR/VR is not natively available in Odoo but can be explored through external system integrations. Custom development may enable AR overlays by connecting with Odoo's inventory and picking data in real time."



# Warehouse Models

Warehouses are no longer one-size-fits-all. As logistics strategies grow more complex, different warehouse models have emerged—each tailored to specific business needs, product types, and operational priorities.

This section explores the key warehouse types in 2025, from basic storage facilities to Al-powered smart warehouses, highlighting how their structure, function, and technology requirements vary based on their role in the supply chain.







# **Basic Warehouse**

To store inventory in a simple, low-cost environment—typically with manual or semi-automated operations.

A fundamental storage facility used for holding inventory before it's moved to its next destination (e.g., retail stores, production facilities, or end customers).

Operations are typically manual or semi-automated, relying heavily on human labor for tasks like receiving, putaway, picking, and packing.

# Example

Small, independent hardware stores or local distributors of non-perishable goods. They often handle a manageable volume of goods and prioritize cost-effectiveness over high-speed automation. Their inventory might be less time-sensitive, allowing for manual processes.



# Feasibility in Odoo

To achieve the Basic warehouse setup in odoo, users could set up the inventory module as follows using standard features of Odoo, with

- Enable Lot and Serial number feature
- Product Data
- Contact Master data





# **Fulfillment Centers**

Warehouses specifically designed to process and fulfill individual customer orders, primarily for e-commerce businesses.

They focus on speed and efficiency in picking, packing, and shipping individual items to consumers.



## **Example**

E-commerce retailers like ASOS or smaller online businesses selling directly to consumers. They need to handle a large number of individual orders with speed and accuracy to meet customer expectations for online shopping. Efficient picking and shipping are critical to their business model.

# Feasibility in odoo

- Enable lot/serial number feature
- Product must be tracked by lot/serial number
- Need to have an e-commerce setup to receive orders from customers and track orders efficiently.
- With more complicated requirement some customization is required





# Cold storage warehouse for Perishable goods

Specialized warehouses designed to maintain precise temperature and humidity levels to store perishable goods like food (fruits, vegetables, meat, dairy), pharmaceuticals, and some chemicals.

Temperature control is critical to prevent spoilage and maintain product integrity.



Their products are highly sensitive to temperature fluctuations, and maintaining the cold chain is essential for safety, quality, and regulatory compliance.

- Distributors of fresh produce (e.g; Chiquita),
- Frozen food companies (e.g; Birds Eye),
- Pharmaceutical distributors require cold chain storage. (Pfizer, AstraZeneca)



# Feasibility in odoo

Odoo offer a significant way to track the product inside inventory app, depending on the demand of the warehouse temperature sensitives goods can also be store and track within Odoo, through some degree of customization

- Enable lot/serial number feature
- Enable Expiration date feature of the product.
- Product must be tracked by lot/serial number
- Integration with temperature sensor devices through customizations.



# **Fully Automate warehouse**

Warehouses where most or all operational processes (receiving, storage, retrieval, sorting, and shipping) are performed by automated systems with minimal human intervention. These often involve sophisticated robotics and control system



Large e-commerce giants 'Amazon'

To achieve maximum efficiency, speed, and accuracy in handling massive volumes of goods, reduce labor costs, and operate 24/7. move of the Amazon warehouse



# Feasibility in odoo

Although Odoo do not have a feature that directly support the needs of automation warehouse, a sophisticated setup of Odoo could achieve is through complex inventory setup and need of integration with automatic sorting system to sync with automate the warehouse operation.

- Enable product Lot/Serial number
- Barcode and RFID for Rapid product identification
- Setup Routing and putaway rules for product categoteis and destination
- Integration with the sorting system
- Integration with shipping provider





# **Distribution Center (DC)**

A facility focused on the rapid movement of goods to retail stores or other points of sale. DCs typically hold inventory for a shorter period than traditional warehouses and emphasize efficient flow and consolidation of goods rather than longterm storage.



### **Example**

Retail chains like Walmart,

Target, or fashion retailers with numerous stores. They need to efficiently receive bulk shipments and quickly distribute them to their retail locations to ensure shelves are stocked and customer demand is met.

Speed and throughput are key for their operation.

# Feasibility in odoo

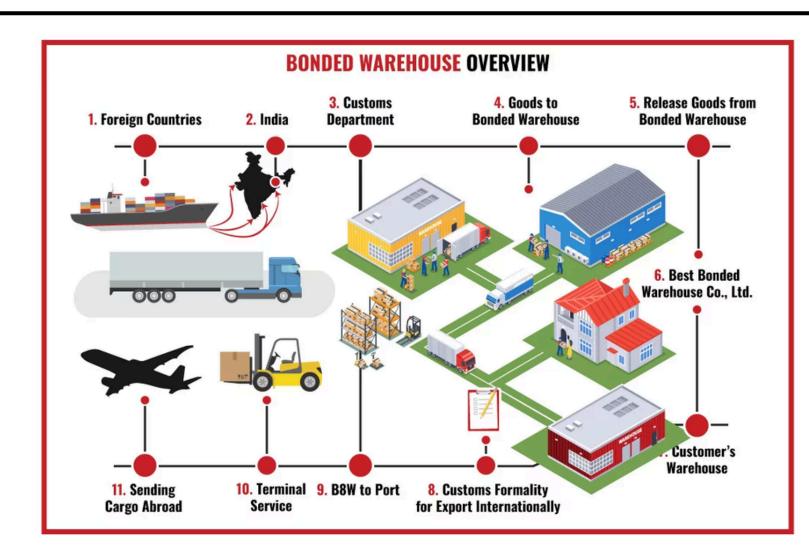
To achieved the distribution center with Odoo, we can use advance inventory setup to answer the demand of rapid product movement and routing

- Setup of contact master data
- Enable Expiration date feature of product
- Enable Lot/Serial number and track the products by them.
- Sales order management
- Inventory setup to handle rapid movement of products
- Integration with Shipping providers software and database.



# **Bonded Warehouse**

A secure facility authorized by customs authorities to store imported goods before duties and taxes are paid. This allows businesses to defer payment until the goods are released for sale or further processing.



### **Example**

Importers of goods like alcoholic beverages (before excise tax), tobacco, or electronics that are subject to duties.

To manage cash flow by delaying the payment of duties and taxes until the goods are needed, and to comply with customs regulations for storing imported merchandise.

# Feasibility in odoo

to achieved the usage of Bonded Warehouse within Odoo, the database required the integration between customs clearance software and the shipping service provide in order to track the correct

- Enable lot/serial number feature
- Customization on the product lot/serial number to track additional customs clearance related detail
- Integration with customs management software.
- Integration with shipping service provider software.
- Integration with customs clearance software





# Smart Warehouses (Al & IoT-integrated warehouse)

Warehouses that leverage advanced technologies like Artificial Intelligence (AI), the Internet of Things (IoT), machine learning, and data analytics to optimize all aspects of operations. These warehouses aim for proactive decision—making, predictive maintenance, and highly efficient processes.



### Example

Leading logistics companies like DHL or FedEx

Or large e-commerce business that maximized warehouse efficiency, achieve unprecedented levels of efficiency, responsiveness, and cost savings through data-driven optimization and intelligent automation. they use Al and IoT across its global fulfillment network for optimization and forecasting.

They aim to anticipate problems, optimize resource allocation, and provide superior service.

# Feasibility in Odoo

To achieved smart Warehouse in Odoo the database and inventory must be prepare to provide support for various feature externally, this basically mean eve

- Setup of contact master data
- Enable product expiration date
- Enable lot/serial number feature
- Setup warehouse route
- Integration tracking system throughout the warehouse operation
- Integration with external software and devices through IoT box and customisation
- API integration with AI database or AI service platform.
- Custom IoT & Al integration through Odoo's IoT box
- Possible AR overlays via third-party development



# Warehouses models and their required technologies

As warehouse operations grow more diverse, selecting the right technologies for each model becomes critical to achieving operational efficiency, compliance, and scalability. Not every warehouse needs advanced robotics or predictive analytics—but every warehouse does need the right tools for its specific function.

The following table presents a side-by-side comparison of common warehouse types and the technologies most suitable for their needs. This matrix helps decision-makers quickly identify how foundational and emerging technologies align with various operational models—enabling smarter investment and system planning.

Warehouse Type	Lot/Serial Tracking	RFID	WMS	loT	AMRs/ AGVs	VR/AR
Basic Warehouse				>		
Fulfillment Center		<b>✓</b>		<b>&gt;</b>		
Cold Storage Warehouse				<b>✓</b>		
Distribution Center		<b>✓</b>		<b>&gt;</b>		<b>✓</b>
Fully Automated						
Smart Warehouse				<b>✓</b>		





# 1. Basic Warehouse

To store inventory in a simple, low-cost environment—typically with manual or semi-automated operations.

### Technologies:

- Lot & Serial Number Tracking
- RFID (Radio-Frequency Identification)
- Barcode or Manual Inventory Entry
- Basic Inventory Setup in WMS

### Example: Local Building Supply Stores

They store a variety of construction materials like lumber, bricks, and tools, which don't require specialized conditions. Their operations might be less time-sensitive, and they may rely on manual processes for managing inventory and fulfilling orders for local contractors and individuals.



# 2. Fulfillment Centers

To quickly pick, pack, and ship individual customer orders—especially for e-commerce operations.

### Technologies:

- Lot & Serial Number Tracking
- RFID (Radio-Frequency Identification)
- WMS (Warehouse Management System)
- IoT
- Vertical Storage Solutions
- AMRs & AGVs

### **Example:**

### **Zalando (Online fashion retailer)**

They operate large fulfillment centers to handle the massive volume of individual clothing and accessory orders from online customers. These centers are optimized for rapid picking, packing, and shipping to meet customer expectations for fast delivery.

- High-Speed Sorting Systems
- Pick-to-Light / Put-to-Light
- RFID + Barcoding
- WMS + Order Integration
- Automated Packing Machines



# 3. Cold Storage Warehouse (Perishable Goods)

To store temperature-sensitive products like food, pharmaceuticals, or chemicals in climate-controlled environments.

- **Technologies:** Lot & Serial Number Tracking
  - RFID (Radio-Frequency Identification)
  - WMS (Warehouse Management System)
  - IoT integration
  - Vertical Storage Solutions
  - AMRs & AGVs

#### **Example: Lineage Logistics**

Lineage Logistics is one of the world's largest cold storage companies, providing temperature-controlled warehousing for a wide range of perishable goods, including frozen foods, produce, and pharmaceuticals, ensuring the integrity of the cold chain.

- IoT Sensors for Temperature & Humidity
- Expiration Date Tracking
- Insulated Shelving & Seals
- Real-Time Environmental Alerts
- Cold Chain Data Integration
- Temperature Control Systems
- Specialized Doors and Insulation seals
- Air Circulation Systems



# 4. Fully Automated Warehouse

To automate all warehouse operations with minimal human involvement—maximizing speed and reducing labor costs

### Technologies:

- Lot & Serial Number Tracking
- RFID (Radio-Frequency Identification)
- WMS (Warehouse Management System)
- IoT integration
- Vertical Storage Solutions
- AMRs & AGVs

### **Example:**

#### Ocado (online grocery retailer)

Ocado operates highly automated warehouses where swarms of robots work on a grid system to pick and pack grocery orders with minimal human intervention, achieving high levels of efficiency and speed for online grocery delivery.

- AI-Powered AS/RS Systems
- Conveyor Belts & Robotic Sorters
- AMRs for Inventory Movement
- Predictive Analytics + Digital Twins
- Full System Automation via WMS





# 5.Distribution Center (DC)

To receive bulk goods and redistribute them efficiently to retail locations or other warehouses.

## Technologies:

- Lot & Serial Number Tracking
- RFID (Radio-Frequency Identification)
- WMS (Warehouse Management System)
- IoT integration
- Vertical Storage Solutions
- AMRs & AGVs

### **Example:**

#### **Walmart**

Walmart operates a vast network of distribution centers that receive bulk shipments from suppliers and then efficiently sort and ship these goods to their numerous retail stores across the country, ensuring timely replenishment of shelves.

- High-Speed Sorting System
- Dock Management Systems
- Cross-Docking Software
- Yard Management Systems



# 6. Bonded Warehouse

To receive bulk goods and redistribute them efficiently to retail locations or other warehouses.

### Technologies:

- Lot & Serial Number Tracking
- RFID (Radio-Frequency Identification)
- WMS (Warehouse Management System)

### **Specific Technologies:**

- Customs Management Software
- Mandatory security Systems on storage area

### **Example:**

### **DHL Global Forwarding**

(offering bonded warehousing services)

DHL provides bonded warehousing facilities where importers can store goods without paying customs duties or taxes until they are ready to be released for domestic consumption or re-export. This helps businesses manage their cash flow and comply with customs regulations.





# 7. Smart Warehouses (AI & IoT-integrate warehouse)

To run advanced, self-optimizing warehouse operations using AI, machine learning, and connected devices.

### Technologies:

- Lot & Serial Number Tracking
- RFID (Radio-Frequency Identification)
- WMS (Warehouse Management System)
- IoT integration
- Vertical Storage Solutions
- AMRs & AGVs

# Example: Amazon

Amazon utilizes advanced AI, robotics, and IoT in its fulfillment centers to optimize various processes, including inventory management, order picking, and delivery. Their systems use data analytics to predict demand, optimize routes for robots, and improve overall efficiency.

- AI & Machine Learning
- IoT Sensors
- AR for Picking
- Predictive Maintenance Systems
- Digital Twins



# Let's Build Your Smart Warehouse Strategy

Your warehouse is more than storage—it's a competitive advantage waiting to be unlocked.

Talk to our experts about aligning warehouse models, technologies, and Odoo ERP to drive real operational gains.



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