

WHITE PAPER

# Top warehouse trends for the decade ahead

## Abstract

Over the next decade, a number of trends will dramatically affect warehouses and distribution centers. New technologies will change the way work is accomplished. A younger workforce will have its own expectations for job performance and personal satisfaction. Geographic trends will open up new areas of the world and necessitate new warehouses near urban centers. And, of course, customers' product, service and delivery expectations will increase – while they expect to pay a lower price. How can your company's warehousing operations remain profitable and satisfy market expectations in this incredibly challenging environment? The answer is simple: By beginning to make meaningful changes now. This white paper reveals some of the biggest warehousing trends over the next 10 years – and provides recommendations to help you lay the foundation for future excellence today.

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# 1

## Introduction

Despite the fact that warehouses have been around for hundreds of years, they continue to evolve and will see even more tremendous change in just the next 10 years. The convergence of dramatic changes in customer demands, along with the constant advancements in technology, is leading to a revolution in warehouse capabilities — but this revolution brings challenges along with opportunities.

This white paper provides an overview of some of the more important trends that will impact the world of warehouse operations in the next 10 years:

- **Higher workforce expectations**, especially related to the availability of advanced technology
- **Continued focus on regulatory compliance**, bringing more intuitive tracking and traceability tools
- **Next-generation postponement strategies** based on more on-demand manufacturing
- **Increased use of automation and robotics** to cut costs and address human labor shortages
- **Geographic expansion** into Asia Pacific, Latin America and the Middle East
- **Increased presence in urban areas**, in order to facilitate rapid delivery
- **Compressed order processing times** required to meet aggressive same-day delivery demands
- **Greater internal and external collaboration** to increase responsiveness to customer needs
- **Smart optimization** via continuous learning and improved asset utilization

Businesses that anticipate these trends, and focus on strategic investments in their warehousing capabilities, will be able to seize a competitive advantage. They will also be positioned to continue to adapt as conditions change beyond 2026.

# 2

## Higher workforce expectations

In the next 10 years, it is certain that the warehouse workforce will undergo a dramatic transformation. As Baby Boomers retire, Millennials and Gen Z will make up the warehouse workforce. As this occurs, it is projected that a labor shortage in the business world will become a major issue — and this will be even more pronounced in the warehouse.

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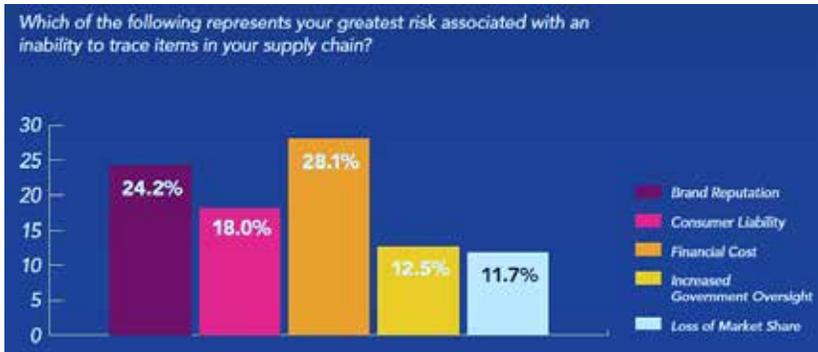
#### Increased demand for technology

The warehouse workers that will be available will have much greater expectations related to advanced technology and general working conditions. Based on all the technology that these two generations have been exposed to in their lives, they will enter the workforce expecting companies to provide them with leading-edge tools that offer the latest user experience — similar to what they use in their everyday lives. Character-based applications will not meet their expectations; they will insist on “app-like” systems. If they don’t find them available, employees will look for companies and jobs that do provide them with the technologies they are comfortable with.

Technology will also dramatically impact how work is performed in the warehouse in the future. For example, warehouse workers will be fitted with a headset, or an optical head-mounted display, that is worn like a pair of eyeglasses. The headset will display role-based information in a smartphone-like, hands-free format. Warehouse workers will communicate with software systems via natural-language voice commands to achieve daily tasks and activities.

In the future, the warehouse worker will also rely on robotics to remotely control common, everyday activities and tasks. Futuristic robotics technology systems will combine unique customized software with inventory storage pods and robots to manage the storage, movement and sorting of inventory. The technology will be based on a warehouse configuration laid out on a grid — with inventory pods in the center, workstations on the perimeter and a control system that directs the hardware.

These are just a few of the ways that the working environment in warehouses will be required to evolve beyond today’s thin client web and mobility applications in order to meet the needs of Gen Z and Millennials.



### 3 Continued focus on regulatory compliance

The last decade has seen an unprecedented increase in the complexity of today’s global supply chain. More products come from more suppliers, located in more places, than ever before. Managing, monitoring and auditing the procurement, production, storage, transportation and handling of inventory in such an environment presents a significant challenge to businesses up and down the supply chain. And, as the challenges expand, so do the laws and regulations enacted by countries around the globe designed to govern food and pharmaceutical handling and ensure consumer safety.

Tracking and traceability tools have increasingly been adopted in today’s warehouses to ensure compliance and monitor product movements. A recent survey conducted by JDA demonstrates that tracking and traceability solutions are viewed as a necessity in many organizations today. Lacking these tools, executives fear damage to their brand reputations, consumer liability, financial costs, increased government oversight and loss of market share.

As we march toward 2026, we will continue to see a strong emphasis on the ability to track and trace products in the food and pharmaceutical industries. However, government requirements will become even more complex, which is bad news for companies already struggling to understand and address track-and-trace requirements in their warehouses today. JDA’s recent survey revealed that only 53.9 percent of warehouse executives believe their organizations are fully compliant today.

In the future, tracking and traceability tools will become more intuitive, as well as more customized to meet the specific challenges of different businesses. This will increase executives’ confidence and help them ensure compliance with the increasingly complex regulations and standards of the next decade.



## 4 Ushering in a new generation of postponement

The concept of postponement has been around for a number of years. However, it is on the verge of a revolution for a number of reasons.

First, the demand for customized products is accelerating at a rapid pace. In today's hyper-competitive marketplace, customers have the power to say, "I want it now and I want it exactly my way." As a result, many companies are being forced to turn their warehouses into manufacturing or final assembly plants. In these facilities, mass-produced, semi-finished items are stored, awaiting an order by a customer. At that point, final processing or customization is performed according to the desires of the specific customer. This is obviously a new postponement model we have not seen before.

Second, new technologies are becoming available that will give manufacturers the ability to create truly custom products for their customers in a fast, cost-effective manner. Technologies such as 3D printing, or additive manufacturing, are allowing for a new degree of product customization. The goal of these emerging "on demand" manufacturing technologies is the ability to make exactly what a customer wants, whenever and wherever they want it. Today, this process is used for building prototypes for large-scale production runs, as well as high-value, unique manufactured products. But in the near future, it will become more commonly used in a variety of industries.

The impact of these two trends on the supply chain will be profound. Manufacturers will strive to have more direct contact with the end customer — in some cases bypassing the retailer. Faster response times to specific customer requests will be possible. Manufacturers will be able to react to product trends and changes in market demand faster and more cost-effectively than ever.

But the greatest impact of on-demand manufacturing may be that it will reverse the trend toward globalization. As much of the labor that's currently involved in the manufacturing process is eliminated, the advantages of sending materials overseas for production will disappear. It will be possible to keep goods in the home market, delaying final manufacturing until the product has been purchased by a customer.

Reflecting these macro-level trends, warehouses themselves will experience a number of changes:

- They will become much more involved in final production processes and will double as manufacturing plants.
- Warehouses will be more involved in the movement and storage of raw materials that feed the production process for new technologies like 3D printing.
- Finished goods inventory levels and dollar values will be greatly reduced as the supply chain becomes more focused on make-to-order as opposed to make-to-stock.
- Warehouse footprints will become smaller, as the amount of inventory on hand is reduced. This will be especially true in the spare parts market — where, today, parts are stored for years with the expectation that at some point they will be purchased. In the future, those parts won't be built until they are needed by a customer.



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### Increasing use of automation and robots

Over the next 10 years, we expect there to be a significant growth in the use of material handling automation and even robotics in the warehouse. In the recent past, companies have had a “love-hate” relationship with automation. While automation has always provided substantial benefits in cost and velocity, it has been limited in its ability to adapt to fluctuations in volume, as well as changes in the business model.

To solve this problem, automation vendors have worked hard to develop more flexible solutions. As a result, the industry is now seeing tremendous growth that will continue into the foreseeable future. There are three root causes driving this growth — and these trends should continue to support the widespread adoption of automation in warehouses.

First, as we discussed previously, the real shortage of warehouse labor projected for the future will necessitate the use of machines to do the work done by humans today. If a company can maximize the use of machines that can do the jobs of humans, fewer workers will need to be recruited, trained and retained.

Second, extreme global competition will continue to exert cost pressures on warehouse operations. One of the best ways to address this is to take human labor costs out of the equation, replacing workers with robust equipment that can operate 24/7. Machines work through typical shift breaks and are not governed by labor laws. They don't need time off for legal holidays or vacations. In addition, they don't experience lost-time accidents, take sick days or require benefits packages.

Finally, the ever-more demanding customer will force warehouses to fulfill orders in smaller quantities, as well as within much shorter lead times from order entry to delivery window. Warehouses will use more automation to address the increased velocity of the order fulfillment process.

## 6

### Geographic expansion

As technology steadily improves, more companies in more regions of the world can enter the warehousing arena. We are seeing a continual march in the world's emerging markets to adopt state-of-the-art warehousing technologies and practices.

New warehousing competitors in Asia Pacific, Latin America and the Middle East will continue to adopt new technologies and advanced work processes to meet the demands of their customers profitably. Around the world, companies will begin to experience competitive pressures based on these new market entrants. They will look to the leading economies for solutions to these problems.

## 7

### Increased presence in urban areas

There are currently more than 800 cities in the world with populations of more than 1 million people. In fact, today about 50 percent of the world's population lives in urban areas — and that percentage is expected to grow to 70 percent by 2050. This means, for most businesses, their customers will be increasingly concentrated in fewer areas.

In order to support shorter and shorter delivery times — which is a necessity in today's environment of extreme competition — companies will need to greatly increase the number of warehouses in their networks. They also need to ensure that they have warehouses much closer to the densely populated urban areas where their customers live.

In the past, many companies tried to remain competitive by having one warehouse centrally located in the middle of the country. But that strategy will no longer work as the marketplace demands same-day or next-day service on many orders.



This requirement of proximity to the end customer will have additional operational implications. Warehouses will necessarily be smaller because their market will be more concentrated. However, the cost of land near urban areas will be more expensive. As a result, companies will look to use automated storage systems that can store more products vertically, in order to compensate for smaller, higher-priced plots of land.

## 8 Compressed order processing times

In just the past few years, customers' delivery expectations have migrated from several days to next day. Today, there are companies beginning to offer same-day and even next-hour delivery as a way to win customers. In addition to the obvious impact on the transportation infrastructure, same-day and next-hour delivery promises require the warehouse to have very short order execution timelines.

To meet this need, companies will invest in state-of-the-art equipment and systems that support agile order processing. Advanced warehouse management systems (WMS) will provide users with the ability to perform operations in real time, so that short-timeline orders are worked on immediately. Warehouses will also benefit from sophisticated optimization engines that continually look at the workloads and capacity of each employee. These optimization engines will make real-time decisions that maximize workers' productivity, while also prioritizing tasks to meet the most urgent customer demands.

Automation will be used to expedite the increased throughput needed to compress order-processing cycle times. Since automated equipment is able to perform many warehouse tasks much more rapidly than a human, this will be an essential capability for leaders in the industry.

By anticipating this trend and investing in advanced order-processing and automated systems, companies will be well positioned to accommodate increasing customer demands over the next decade and beyond.

## 9 Greater internal and external collaboration

In the 2026 warehouse, collaboration will be a key tenet to running a successful operation. As customers demand greater speed and responsiveness, the distribution channel will need to be able to anticipate their needs better — and react in a more real-time manner than ever before.

This means it will be critical for executives to understand not only what is happening inside the warehouse, but also what is going on outside its four walls. Close collaboration with customers, stores and vendors will need to become the norm. Being aware of inventory levels and re-order points at each retail store will become business-as-usual. This means the warehouse must have advanced visibility, as well as the ability to actually plan and pick inventory in advance, so that employees won't find themselves in an emergency situation every day. This new level of collaboration will also allow supply chain personnel to partner with store executives to better understand when a priority item needs to be picked and shipped in real time — without the need for dozens of emails and phone calls.

This upstream collaboration also enables better planning for both labor needs and inventory levels within the distribution center. Providing visibility into the store allows the warehouse to react in a smarter, more cost-effective manner. Instead, today many companies just throw headcount at delivery problems at the end of each shift.

Finally, increased downstream collaboration with vendors will also pay huge dividends in the future. Close vendor relationships allow the distribution network to reduce on-hand inventory, while still meeting stores' shelf needs. On-hand inventory will continue to be a pressure, but having this visibility to the store shelf will allow the warehouse to collaborate with vendors and transportation partners, reducing excess inventory significantly.

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### Smart optimization

When most people think of warehousing, they think of big structures that contain products, people, racking and equipment — all focused on receiving, storing and shipping inventory. For those of us who live, breathe and continuously strive to improve all aspects of warehousing and distribution, these structures represent exciting opportunities for optimization. We constantly work to improve how tasks, resources, equipment and infrastructure are leveraged based on today's information and constraints.

When you think of Amazon Fulfillment you think of optimization, efficiency and excellence at all levels — regardless of whether Amazon is actually profitable. Through the use of purpose-built facilities, efficient space planning, optimal SKU placement, robotic automation, and well-connected planning and execution solutions, Amazon has emerged as a global warehousing force. Yet Amazon's practices have only scratched the surface of smart warehouse optimization.

Optimization by definition is “the process of finding the greatest or least value of a function for some constraint, which must be true regardless of the solution. In other words, optimization finds the most suitable value for a function within a given domain.” So let's apply that definition to distribution and warehousing. How can a warehouse management system hope to identify the most optimal next task, at a minimal cost, in a space that is full of artifacts and constraints?

The most cost-efficient, high-value and high-throughput facilities will demand new intelligent optimization solutions from their WMS providers — solutions that continuously improve every task that is to be executed. This will require continuous visibility into necessary inputs and constraints such as order

profiles, order delivery times, inventory availability, inventory placement, employee and machine performance, employee certifications and general facility layout bottlenecks. As people and machines execute throughout the day, the ultimate goal is that continuous improvement is being applied to each and every task. The performance of people, machines, inventory and the overall facility must be measured and improved on an ongoing basis.

New adaptive learning technologies will help WMS platforms achieve this goal, by using information gathered throughout the day to learn from constraints and other challenges. These constraints can be employee skills, inventory availability, task accuracy and machine reliability. When each of these competencies is maximized with next-gen WMS solutions, warehouses will become well-oiled, smart fulfillment and production centers.



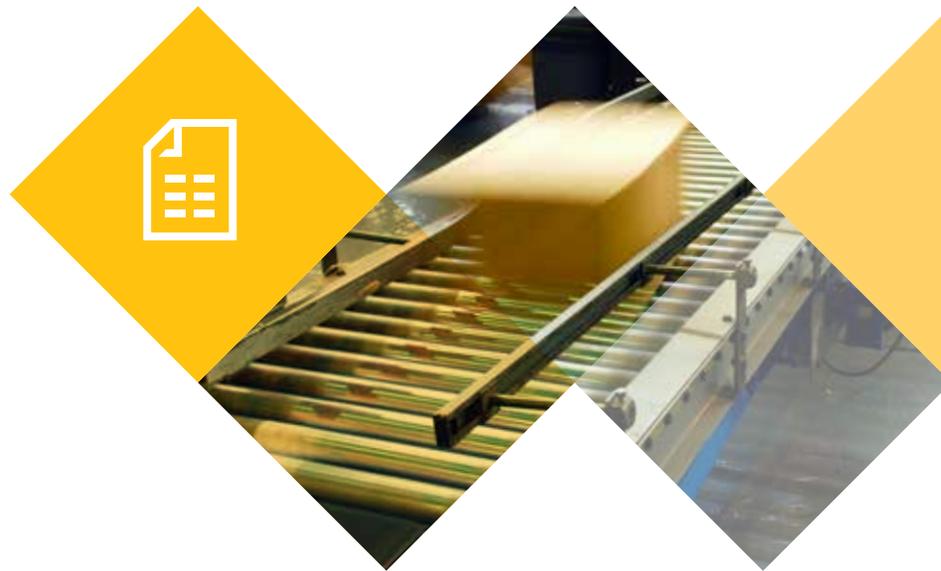
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## Start building the foundation today

As demonstrated in this white paper, companies face major challenges in optimizing their warehouses for cost and service over the next decade. In order to conquer these and other obstacles to success, it is important to start your preparation today.

Preparation means taking a step back to look at the bigger picture. Think about where your warehouse operations are today, and where they need to be by 2026. Then define some specific goals to put some key capabilities in place now. Over a reasonable timeline, define the improvements and investments your business needs to make.

The sweeping changes in the warehousing and distribution industry over the next decade might seem overwhelming. The actions you need to take are too large to tackle at one time, so it is essential to begin acting now and making changes in an incremental fashion. By achieving smaller goals, while working toward a clear vision of the future, you can prepare for business to emerge as a warehousing leader in the dramatically altered competitive landscape of the next 10 years.



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