



Warehousing Vision Study

Dynamic Markets Demand Warehouse Agility

Strategic and operational insights to optimize and advance your operations, outpace your competition and increase your employee satisfaction.

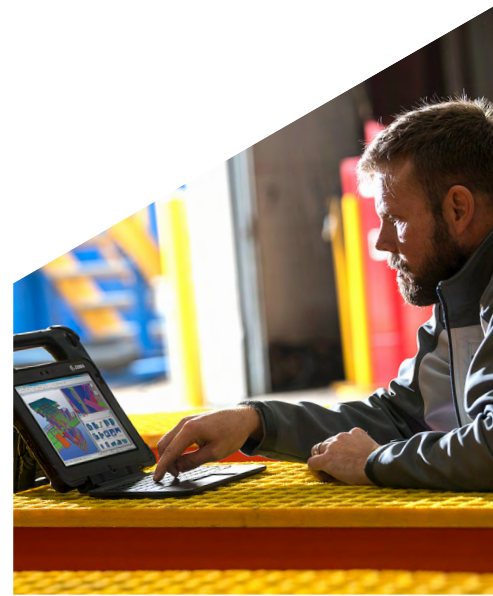
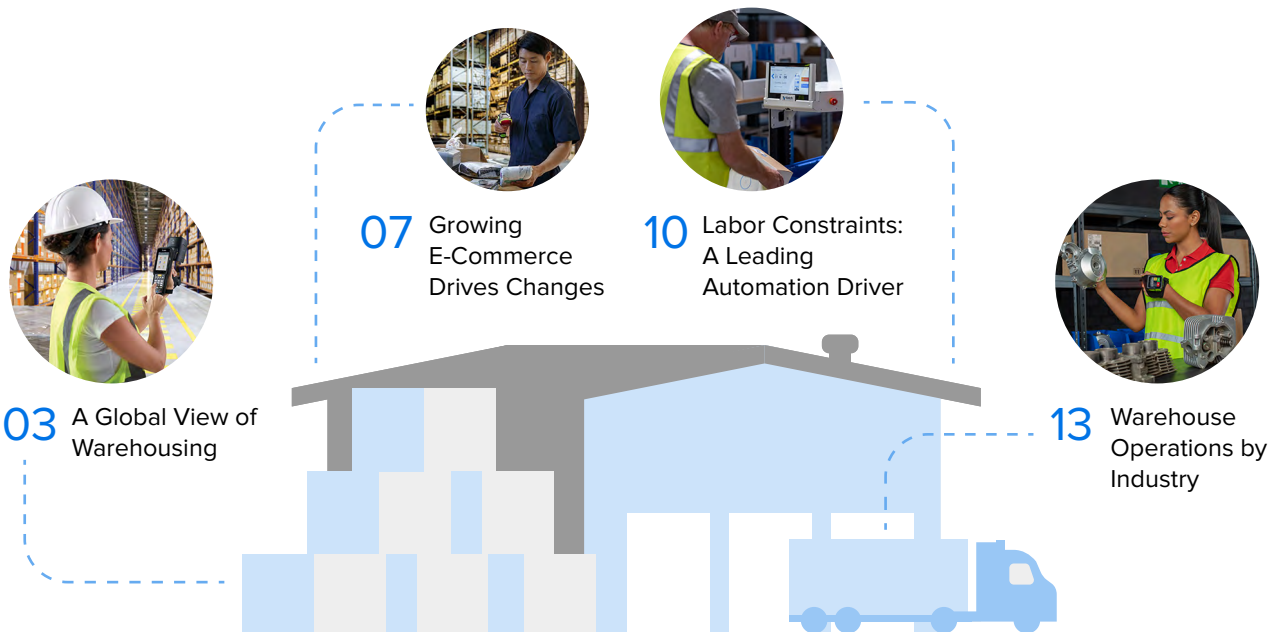




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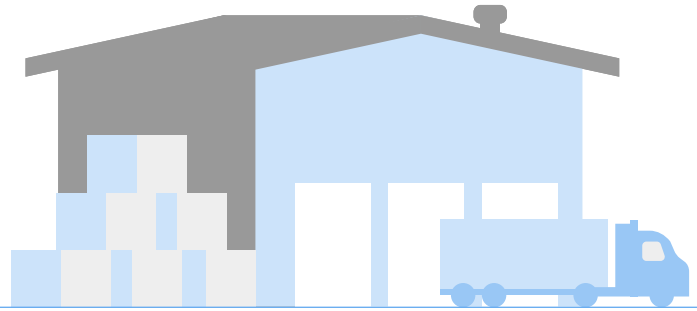


About the Study

Zebra Technologies commissioned a global research study among decision-makers and associates to analyze the latest trends and technologies transforming warehouse operations. The study includes over 1,500 respondents across organizations within manufacturing, retail, transportation, logistics and wholesale distribution. Azure Knowledge Corporation administered the online survey in January – February 2022.

Disruption as a Catalyst for Change in Warehousing

Change is nothing new for those in warehousing, distribution and fulfillment. But the pandemic accelerated a number of trends affecting the supply chain, increasing the need to make warehouse operations as agile, automated and resilient as possible.



1

Global Supply Chains Introduce New Threats

While the pandemic highlighted how quickly supply chain issues can impact the availability of goods, disruption can take place at any time due to natural disasters, geopolitical tensions, cyberattacks, labor strikes and more. As manufactured products become more complex, supply chains are more prone to interruption. The exposure of these vulnerabilities at the height of the pandemic highlighted the need for full supply chain visibility and collaboration. Warehousing decision-makers realize they need to do their part to support these efforts.

2

A Changing Workforce Has Heightened Expectations

As a generation of digital natives enters the workforce, the importance of technology has increased. Among associates surveyed, **92%** agree technology advancement will make the warehouse environment more attractive to workers. When working with technology, **83%** expect the business software applications and hardware devices their employer provides to be as easy to use as their personal smartphones.

Decision-makers have their own expectations for technology, particularly to ensure productivity in difficult hiring markets. Among decision-makers using automation or planning to within three years, **66%** rank offsetting recruitment challenges as one of the top three drivers for doing so.

3

Shifts in Consumer Behaviors Affect Warehouse Operators

Consumers want alternatives to in-store shopping. In the [14th Annual Zebra Global Shopper Study](#), **73%** of shoppers said they prefer to have items delivered to them rather than picking them up, with **58%** having placed an online order to be delivered to them within the three-month period prior to the survey.¹

Retail decision-makers are responding with an increased focus on optimizing their e-commerce order fulfillment operations. In the same study, **80%** of retailers said they are under high pressure to offer a variety of delivery options and speeds, a **43%** increase since 2019.



Decision-Makers' Plans for Changing Market Demands

All sectors



85%

Add third-party logistics (3PL) services support within five years.

In retail



77%

Report drop shipping volumes direct from manufacturers increased an average of 22% over the past two years.

1. Zebra 14th Annual Global Shopper Study Research, Zebra Technologies, 2021

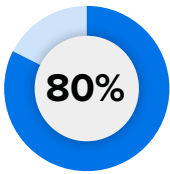
A Global View of Warehousing

For years, warehouse operators have been adapting to changing consumer habits, growing labor recruitment and productivity challenges, as well as increasingly interconnected supply chains.

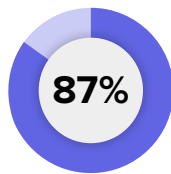
Fluctuating market conditions and new disruptors are prompting decision-makers to accelerate their plans to improve workforce productivity, responsiveness and agility.



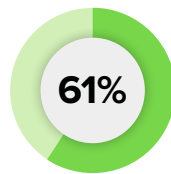
Decision-Makers Focus on Warehouse Modernization



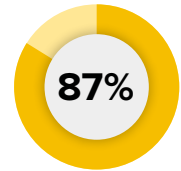
Agree the pandemic prompted faster modernization.



Plan to accelerate timelines of modernization projects within three years.



Plan to implement real-time inventory tracking within a year.



Agree new technology is needed to be competitive in the on-demand economy.

Operational Velocity Demands a New Way Forward

Decision-makers realize the need for resiliency, understand the implications of not making changes and are taking steps to modernize their operations. With the pandemic highlighting many challenges of the on-demand economy, stakeholders realized the need to collaborate across sectors to strengthen supply chains and make them more transparent. The need for speed, increasing order and shipping volumes, and consumers' changing purchase preferences uncovered some key challenges that are driving them to make changes.

Addressing Labor Constraints

Workers play a key role in making warehousing operations more resilient, and labor challenges are a significant concern among decision-makers. **More than half** report finding and training warehouse workers among the biggest challenges their organization faces with regards to labor, and **85%** report they have already prioritized labor optimization or plan to do so within the next three years.



Decision-Makers' Top Three Challenges Due to Increased E-Commerce



1 Faster delivery to end customers



2 Increased transportation costs



3 Inventory accuracy and visibility

Warehousing Evolution by the Numbers

Despite recent challenges, warehouse operators have made progress in several areas they identified as a “priority” in the [2019 Zebra Global Warehousing Vision Study](#). In addition, they are taking on what were likely long-standing challenges they can no longer ignore.

Greater Focus on Outbound Operations

With the rise in e-commerce, decision-makers in the current survey ranked returns management as their top operational challenge, along with many fulfillment-related outbound operations. Concerns and priorities in the 2019 survey were more generalized around recruitment, productivity and utilization. Today, warehouse operators are focused on identifying their weakest operational areas. This will enable them to prioritize improvements more effectively.

Outbound Fulfillment Challenges

	% of decision-makers	Percentage point (pp) increase from 2019
Packing, staging and loading	36%	+11 pp
Order fulfillment time	35%	+5 pp
Picking efficiency	35%	+5 pp
Order accuracy	32%	+3 pp

Positive Workplace Changes

News of short-staffed warehouses and fulfillment centers have dominated headlines for over two years. However, it has not caused current warehouse associates to take a negative view on the matter. In the current survey, **82%** of associates say their employers’ difficulties in hiring and retaining labor has actually prompted improvements. Specifically, they say their employer has:

**60%**

Improved working conditions

**57%**

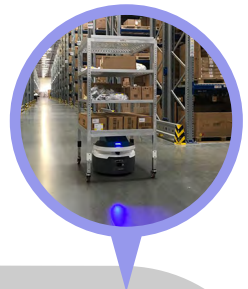
Used technology to make work easier

**45%**

Increased wages and bonuses

**43%**

Provided technology to enable flexible work shifts



Warehousing Evolution by the Numbers (continued)

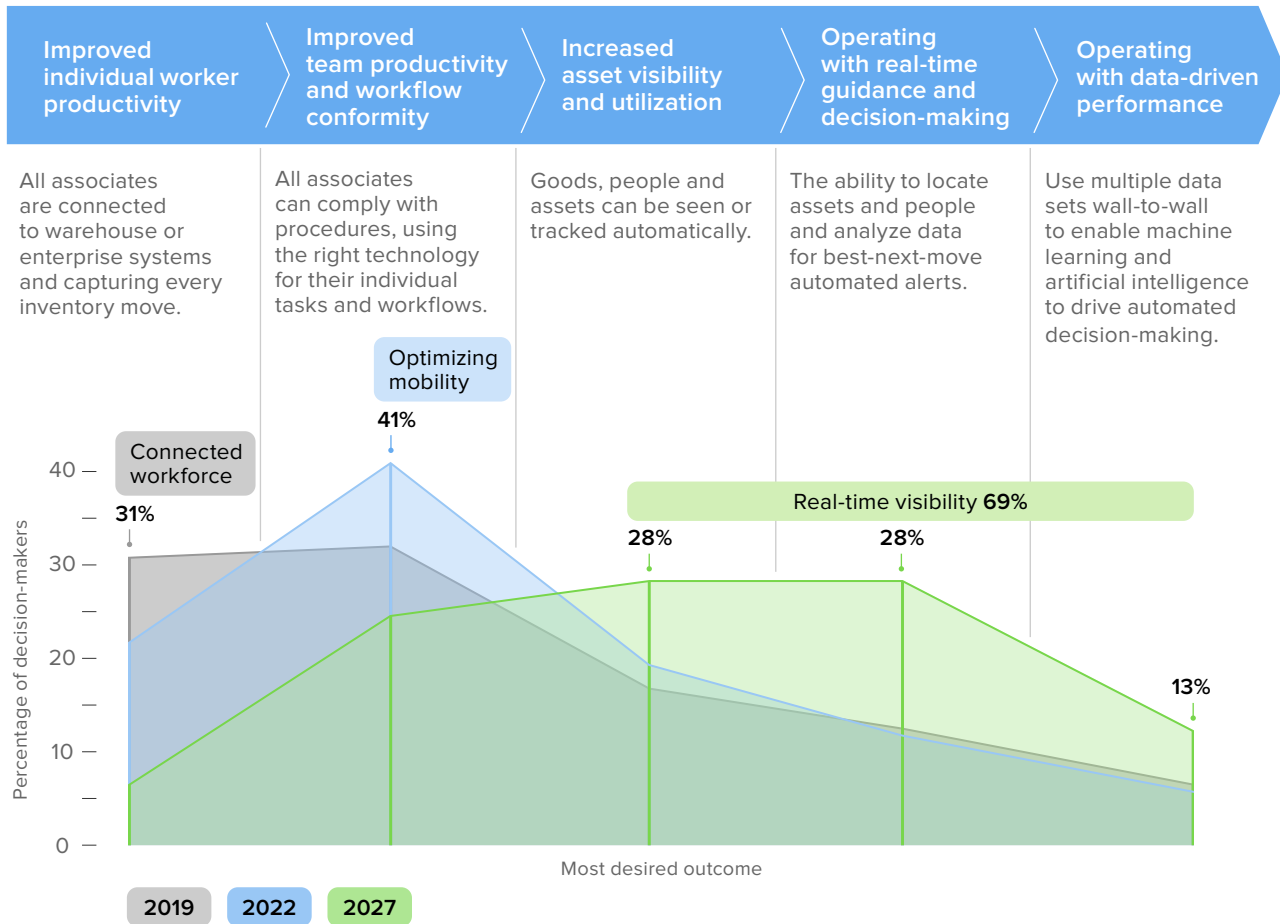
Desire for Increased Productivity-Related Outcomes

In 2019, **nearly a quarter (23%)** of respondents managed operations with all paper-based or fixed workstation systems. Decision-makers say that will drop to only **5%** within the next five years, and a greater focus will be placed on augmenting workers with mobile devices and automation solutions.

Back then, decision-makers were focusing on simply connecting warehouse workers with enterprise systems (**31%**), and some were optimizing that experience (**32%**). Since then, there has been a noticeable shift, as **41%** said they were focused on giving workers the right technology for the task to ensure improved team productivity and workflow compliance outcomes. In five years, almost **70%** of decision-makers would like to achieve more real-time visibility of people, assets and goods, as well as the ability to automate decision-making.



Decision-Makers' Most Desired Outcomes



Where Do We Go From Here?

Decision-makers surveyed across all sectors have plans to address the rise in e-commerce that are both immediate and expected to persist over time.

Pressure To Feed the Omnichannel Ecosystem

In the last two years, **nine in 10** warehouse operators cited average shipping volume increases of **23%** in business-to-business fulfillment, with almost as many seeing the same average increases for direct-to-consumer fulfillment. Manufacturer drop-ship volumes have climbed **22%** on average as well. As a result, respondents say they are planning to increase the volume of items shipped and stock more SKUs.

This underscores what has been done and still remains to realign operations with today's omnichannel ecosystem. Both businesses and consumers must be supplied with the right inventory at the right time, and this is putting pressure on warehouse operators to ensure faster on-time delivery.

Leaning More Heavily on Third-Party Logistics

With warehouse operations' role in customer satisfaction, organizations recognize that they may not have the specialization or the technology to quickly ramp up their operations to meet the demands. As a result, **three-quarters** of decision-makers say they'll add third-party logistics (3PL) services or operations to support increased e-commerce activity within the next three years. In 2019, only **60%** of respondents planned to implement this strategy to support their organization's warehouse operations over a three-year period.

Adapting To Meet Growing Demands

Decision-makers realize they need people to meet new customer demands. Despite the shrinking labor pool and availability of new automation solutions, **86%** of decisions-makers plan to expand their workforce in the next three years to support their increased focus on e-commerce. In 2019, **73%** of decision-makers expected to add headcount as part of their implementation plans.

Even with these hiring ambitions, decision-makers know labor gaps may linger. They are looking to new technologies, services and processes at an even greater rate than in 2019 to better meet the evolving needs of those they serve.

In 2019, about **seven in 10** decision-makers planned expansion of returns management operations, addition of value-added services and utilization of task interleaving to streamline workflows within a three-year period. However, with increased e-commerce activity, more say they will add or expand these operations in three years:

- Returns management operations: **+12 pp**
- Add value-added services: **+13 pp**
- Utilize task interleaving: **+9 pp**

Growth Areas in the Next Five Years

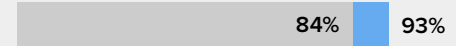
(Percentage of Organizations)

By 2025

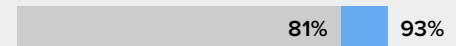
By 2027

Implementing New Processes or Services

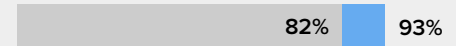
Add real-time inventory tracking



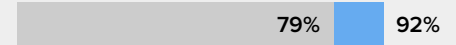
Offer value-added services



Increase returns management operations

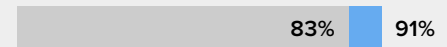


Utilize task interleaving

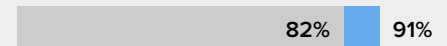


Increasing Volumes

Increase volume of items shipped



Increase stock-keeping units (SKUs)



Reevaluating Physical Operations

Expand size of warehouse facilities



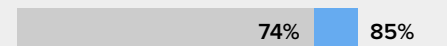
Decrease fixed automation in favor of more flexible automation



Increase number of warehouse facilities



Add third-party logistics (3PL) services/operations



Adding Labor

Increase number of employees





Growing E-Commerce Drives Changes

Today's increased e-commerce activity correlates with an increased demand in the commercial real estate market. CBRE, a commercial real estate services and investment company, estimates that every \$1 billion of e-commerce sales requires 1 million square feet of new distribution space. With the expected \$1.5 trillion rise in e-commerce by 2025 globally, CBRE predicts 1.5 billion square feet of warehouse/distribution space will be needed to accommodate this growth.²

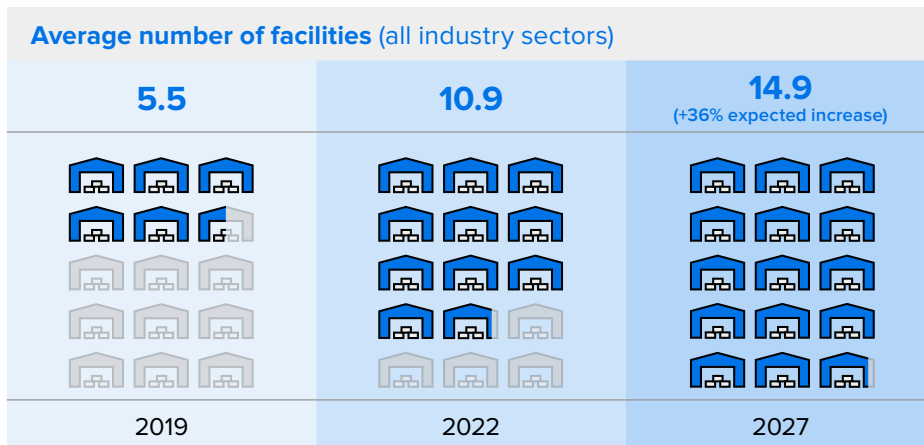


Increasing Demand for Warehouse Space

In alignment with CBRE's predictions, decision-makers confirmed plans to expand or increase their warehouse facilities in the next year due to rising e-commerce activity. Within the next year, decision-makers said they will have expanded the size of their warehouse facilities (72%), increased the number of warehouses (55%), or relocated their facilities (50%).

Manufacturers and wholesalers expect the most significant increase in the number of warehouses they will operate in the next five years, with a 42% and 38% increase in the number of facilities, respectively. Retailers have one of the lowest expected increases in number of warehouses (a 32% increase in five years), likely due to their ability to leverage existing brick-and-mortar stores for order fulfillment.

Warehouse Facility Growth Comparison Through 2027



Operational Improvements Lead the Way to Modernization

As decision-makers accelerate modernization project timelines and 62% increase funding to modernize and/or scale existing projects, the opportunity to connect such projects to planned facility additions or expansions can deliver a greater return on investment (ROI).

2. CBRE, U.S. Will Need 330M Sq. Ft. of Additional Distribution Space by 2025 to Meet Robust E-Commerce Demand



Decision-Makers' Improvement Plans

In the next 1-3 years

Increase Visibility

55% Invest in inventory and asset visibility within the warehouse

54% Invest in increased visibility across the supply chain

Support Front-Line Workers

56% Automate workflows

54% Prioritize labor optimization

53% Invest in robotics

53% Invest in software that helps automate analytics and decision making



Embracing Technology in New Ways

Decision-makers understand the importance of technology, with **87%** confirming the need to implement new technology to stay competitive in the current on-demand economy. While technology investment carries some risk, **82%** say their organizations believe investing in automation far outweighs the risk of not implementing it.

Today, in addition to augmenting workers with devices and/or automation, **five in 10** say they're also using sensor or real-time location technology in a targeted or widespread manner to speed up and add more visibility to their operations. Doing so helps them provide the best-next-move to their workers, as well as more predictive capabilities. By 2027, almost **six in 10** plan to utilize real-time visibility.



Decision-Makers Rate Operational Maturity by 2027

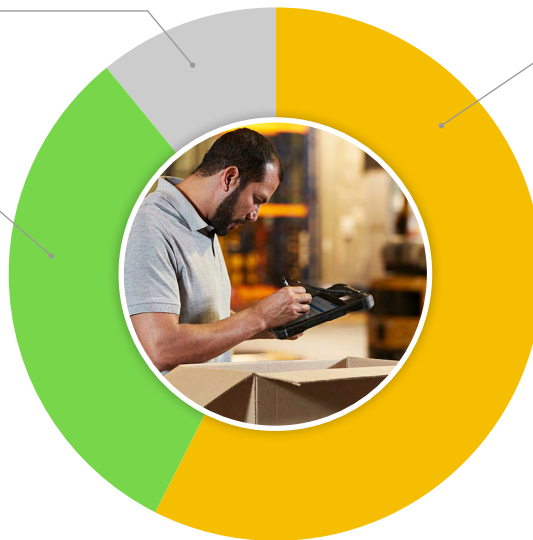
10% Siloed and Reactionary

Inefficiencies due to lack of inventory and workflow visibility

32% Augmented Workers With Mobility and/or Automation

15% Improving operations by gaining basic control of operations through capturing each inventory move

17% Optimizing the use of mobility by deploying devices and automation based on the task, safety and proper ergonomics



58% Augmented Workers Plus Use of Real-Time Visibility

16% Targeted use of sensors to automate tasks

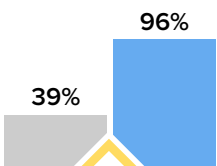
23% Orchestrate widespread use of real-time visibility to automate decision-making based on location

19% Use analysis of multiple data sets to constantly predict and adapt operations

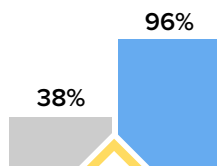
Software-as-a-Service Technology Implementation



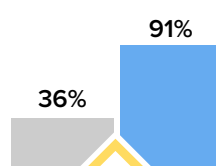
Device Data Management



Machine Learning



Predictive Analytics



2022

By 2027



92%

of associates

Agree technology advancement will make the warehouse environment more attractive to workers.



Embracing Technology in New Ways

(continued)

With respondents' heightened concern about challenges within their outbound packing, staging and loading operations, it's not surprising that many have turned to sensor-based technologies to help automate data capture, information flow and decision-making. Some of the ways sensor-based technologies support these workflows include:



Fixed industrial scanning automates sortation workflows for outbound staging.



Radio frequency identification (RFID) provides irrefutable proof of carton contents at shipping.



Machine vision systems document outbound parcels by inspecting labels.



Real-time location systems (RTLS)

quickly locate material handling equipment, associates and inventory, even in motion.

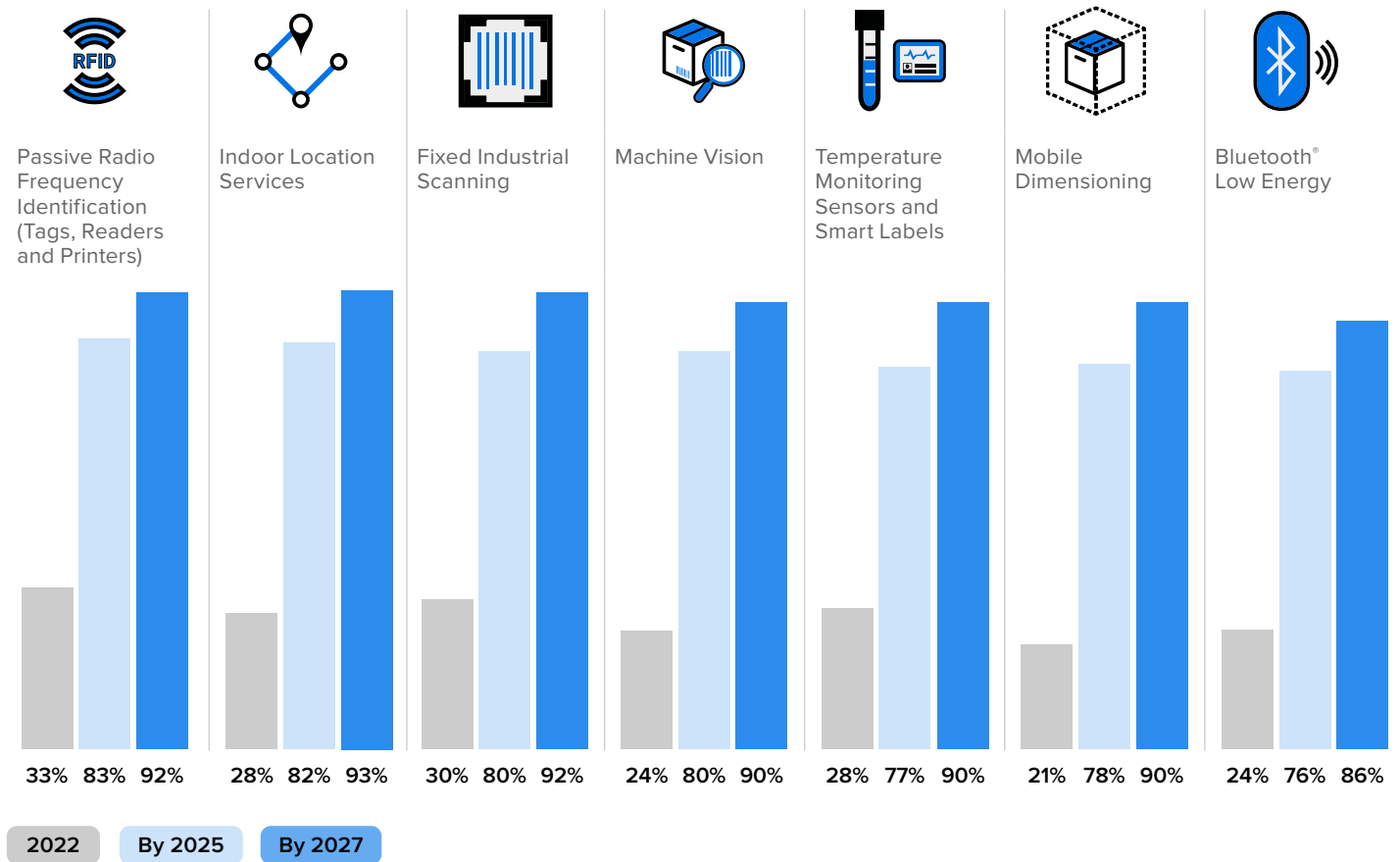


Mobile dimensioning software

can capture accurate parcel dimensions to streamline operations with improved load planning and space utilization.

Each of these sensor inputs can be used with software applications powered by machine learning and artificial intelligence algorithms to provide more prescriptive guidance to front-line workers.

Implementation Plans for Sensor Technologies To Modernize Warehouse Operations



Labor Constraints: A Leading Automation Driver

Warehouse labor is becoming increasingly difficult to attract and retain. Decision-makers say it takes an average of **4.7 weeks** to train new staff to full productivity in warehouse operations. Despite these concerns, it is clear people will continue to play a significant role in the warehouse—but technology will too.

Decision-makers need a backup plan in case it takes longer than expected to hire enough people, especially during peak periods. **Eight in 10** say a greater reliance on automation is in their future. Of those who have already implemented automation or plan to within the next three years, **66%** say they are doing so to offset their recruitment challenges.

Technology's Value in Labor Recruitment

Associate sentiment is greatly influenced by the technology their employer provides them, with **83%** agreeing they would be more likely to work for an employer that gives associates modern devices versus one that provides older or no devices. Decision-makers concur, with **nearly nine in 10** agreeing technology advancement will make the warehouse environment more attractive to workers.

Fortunately, most decision-makers report some level of their workforce is already augmented with technology or devices, and they hope to achieve greater levels of automation to advance their worker augmentation plans within the next five years.

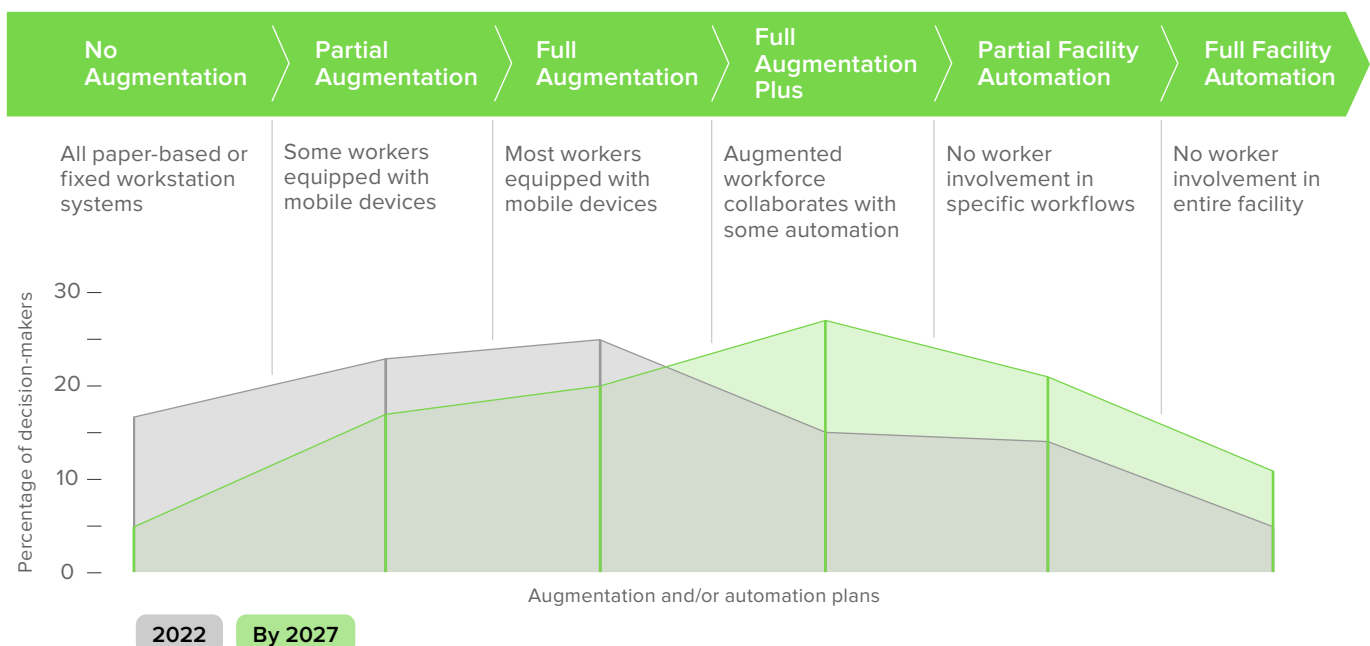
A significant advantage of today's automation technologies is that organizations can start small with options that do not require reconfiguration of floor space, then scale up as use cases are proven.



Top Three Labor Initiatives Ranked by Decision-Makers and Associates Alike

- 1 Reduce unnecessary tasks so front-line workers can focus on customer-centric work
- 2 Optimize the use of temporary/seasonal labor
- 3 Address worker comfort and ergonomics

Decision-Makers' Technology Plans To Augment Labor with Devices and Automation



The First Steps Toward Automation

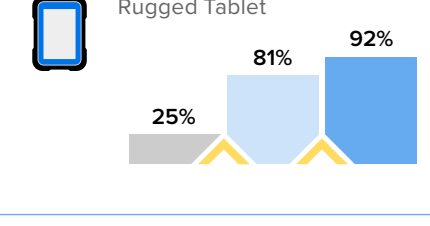
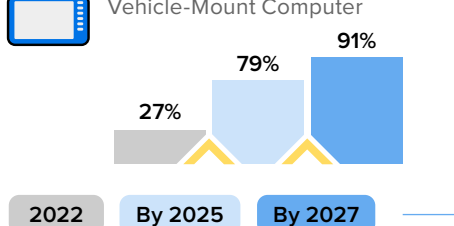
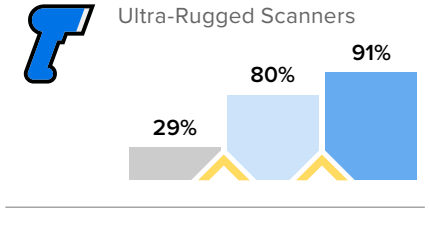
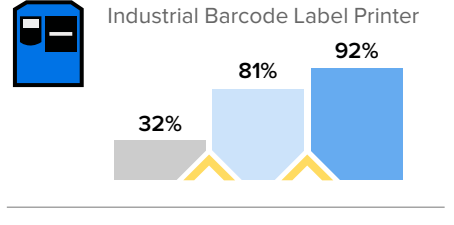
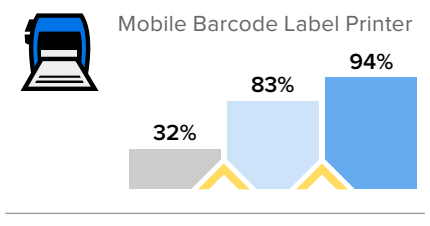
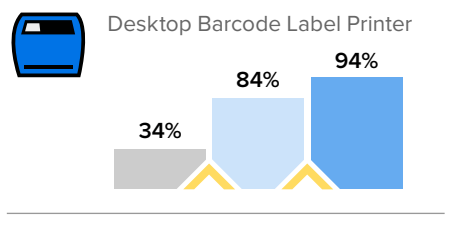
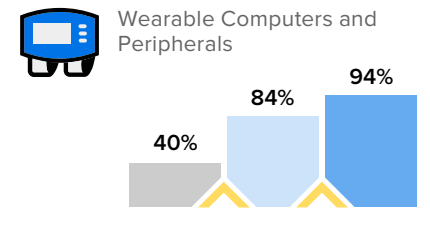
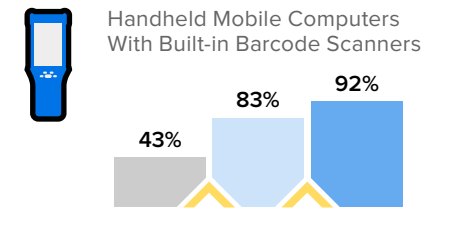
While a high percentage of decision-makers may be comfortable with integrating new technology into their warehouse ecosystems, **61%** said they have some uncertainty about exactly where to start automating their warehouse operations. However, most agree augmenting labor with software and devices first is the best way to introduce automation, and within five years, **nine in 10** decision-makers will seek outside resources to help identify and execute warehouse optimization and automation solutions.

Decision-makers expect to use a variety of devices and form factors, which will help them better optimize the use of mobility. Wearables see increased implementation, while rugged tablets see the most dramatic increase over the next three years. Greater implementation of mobile barcode label printers will bring efficiencies to workflows.

As operations deploy automation throughout their facilities and depend on mobile robotics for autonomous material movement, front-line workers will utilize their devices not only for data capture and retrieval, but also to interact and collaborate with mobile robots.



Equipping Workers With Mobility Devices and Printers

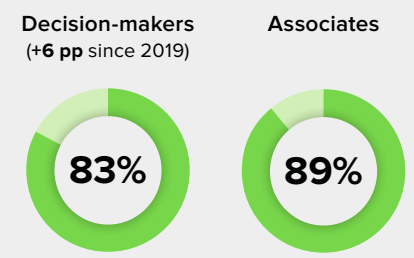


2022 By 2025 By 2027

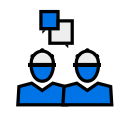
Implementing Warehouse Automation



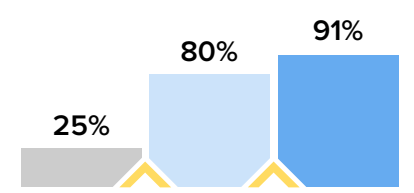
Augmenting labor with technology and devices first is the best way to introduce automation into a warehouse operation.



Decision-Makers See the Value of Connected Workers



Push-to-talk and messaging solutions



Implementation Priorities for Robotics Automation

Lightening the Workload for Front-Line Workers

As warehouse operators reimagine their operations, they are looking for options to use space more efficiently and improve front-line workers' productivity.

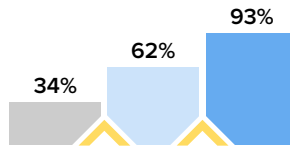
As operators grapple with challenges around order fulfillment processing time, picking efficiency, order accuracy and outbound shipping operations, they are also gravitating to automation solutions that will directly address these challenges. For example, when workers can utilize autonomous mobile robots (AMRs) to help guide what and where to pick—as well as save time transporting goods to, from and between pick zones—they can increase their productivity and accuracy.



Decision-Makers' Current and Anticipated AMR Implementation Plans

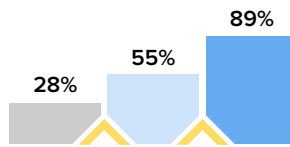
Person-to-Goods

Worker picks in warehouse aisles, guided by AMR



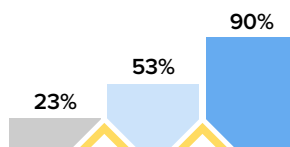
Goods-to-Person

Goods brought to worker at a pick station by AMR



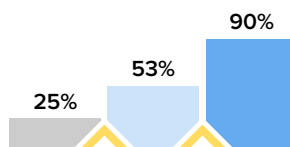
Materials Movement

Individual items, cartons, totes or pallets moved by AMR alongside workers and material-handling equipment



Materials Movement and Sortation

Individual items or cartons moved by AMR using special logic and form-factor enhancements to allow for sorting



2022

By 2023

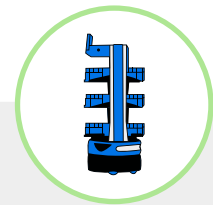
By 2027

Expansion Plans

One attractive option for decision-makers is the robot-as-a-service (RaaS) model. Operators can implement a robotics solution without making a large capital expenditure, while still having flexibility to scale and adapt as demands change. Today, **19%** of respondents are implementing RaaS, with an additional **69%** planning to do so within one to five years.

Safety as a Top Priority

Among all associates surveyed, **over three-quarters** report they would feel safe working alongside AMRs, even though some have not yet worked directly with them. Decision-makers, who likely have experienced mobile robots through their own implementations, pilots or demonstrations, also agree, with **84%** feeling it would be safe to have their associates work alongside AMRs.



Associates' Top Benefits of Working With AMRs

83%

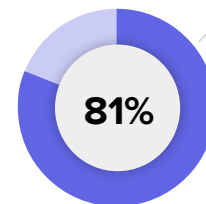
Increases productivity

83%

Reduces travel time and walking

73%

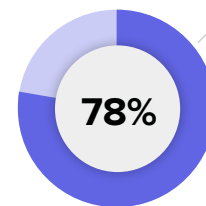
Improves accuracy



of associates

81%

Agree AMRs would make warehouse jobs less stressful.



of associates

78%

Agree walking fewer miles would make their job more enjoyable, even if they had to pick more items.



Warehouse Operations by Industry

Each industry sector plays a critical role in supply chain execution. In a dynamic market like today and the foreseeable future, collaboration will be the key to everyone’s success. Warehouse industry leaders are adapting and evolving their operations to do their part to make a stronger, more resilient ecosystem to do business.



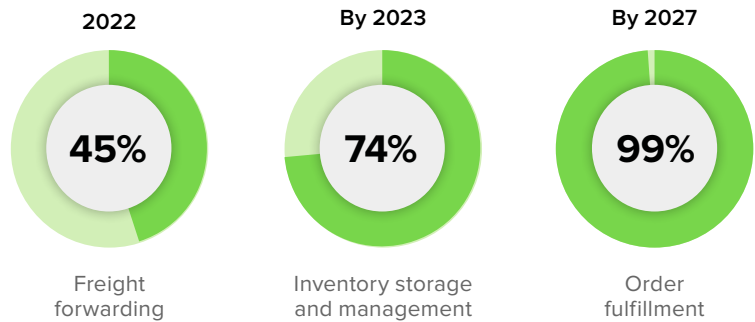
3PL Organizations Prepare To Support Supply Chain Partners

3PL operators are expanding their services as opportunities arise from others in the supply chain that are planning more value-added services or need help handling day-to-day demands.

As more supply chain partners increase their reliance on 3PLs, **30%** of 3PL decision-makers cite onboarding new customers quickly as a challenge for their organization stemming from increased e-commerce activity.

Evolution of 3PL Decision-Makers’ Implementation Plans

Most Implemented



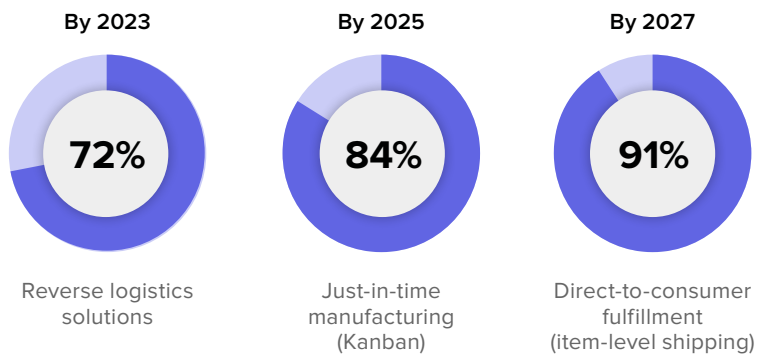
Manufacturers’ Warehouse Operations Critical to Plant and Fulfillment

Inventory and asset visibility in the warehouse is critical for manufacturers. Lineside replenishment with just-in-time inventory keeps assembly lines moving. Accurate accounting for the repairs or refurbishments received enables smooth track and trace and customer accountability. Inventory visibility as it moves from work-in-progress to finished goods allows for accurate inventory reporting.

Manufacturers are leading the way in implementing indoor location solutions, with **34%** already implementing this technology compared to the global response across all sectors of **28%**.

Evolution of Manufacturing Decision-Makers’ Implementation Plans

Most Implemented



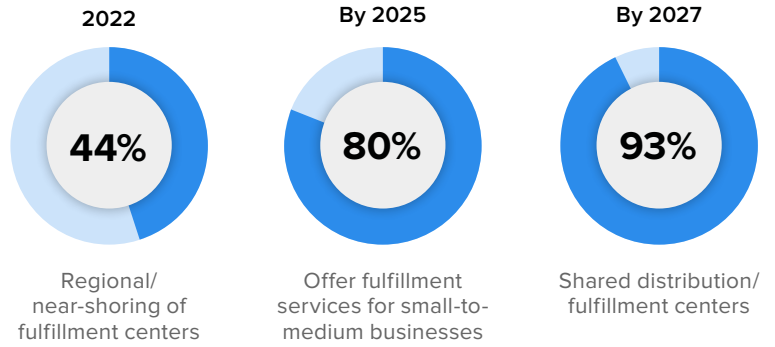
Warehouse Operations by Industry (continued)

The Influence of Omnichannel Shopping on Retail Warehousing

Retailers have a variety of choices for managing how inventory gets to stores and end customers, from getting closer to delivery points to dedicating space for specific operations to having all operations under one roof. Decision-makers are considering a variety of options to keep customers satisfied with faster delivery.

To respond to the demands and growth of e-commerce, many retailers are also leveraging their brick-and-mortar stores for order fulfillment, with **67%** leveraging front-of-store space and **61%** leveraging back-of-store space.

Retail Decision-Makers' Implementation Plans



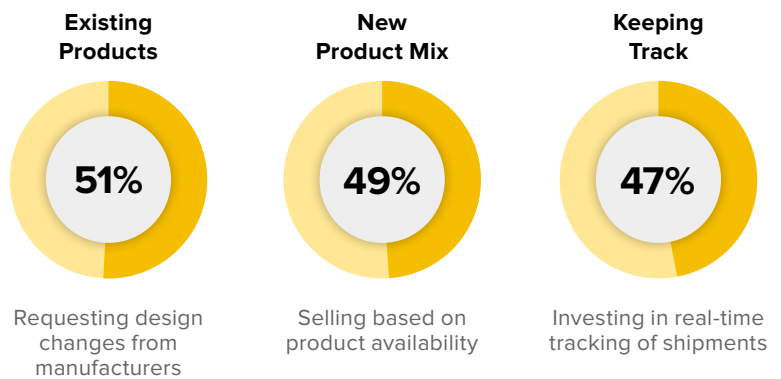
Wholesale Distributors Making Changes To Ensure Inventory Availability

Wholesale distributors are desperate to keep their shelves stocked and to maintain an accurate inventory account. From working with their suppliers on design changes to adjusting their product mix to investing in real-time tracking and air transportation, they have a variety of logistics concerns to address.

The accelerated growth in e-commerce is having specific effects for wholesale distributors.

Almost four in 10 cite order fulfillment processing time as their biggest operational challenge, compared to the global response of **35%** across all industries.

Wholesale Distributors Adapt to Supply Chain Challenges



55%

of wholesale distribution decision-makers will have invested or plan to invest in robotics within the next year.

Regional Perspectives

North America

- **Fifty-eight percent** of decision-makers say the time to fill open positions is too long, making this the top challenge they need to address when it comes to labor initiatives. This is higher than all other regions and **7 pp** higher than the global response.
- **Eighty-six percent** of North American decision-makers say the pandemic has prompted them to evolve and modernize more quickly, the most of any region.
- Within three years, **81%** of decision-makers plan to implement person-to-goods AMRs to collaborate and guide workers in order-picking workflows.

Europe

- **Eighty-five percent** of associates say they are more likely to work for an employer that provides more modern devices to use for tasks, **4 pp** higher than the global response.
- In five years, **83%** of decision-makers in Europe say they will use mobility in their operations, with **47%** also planning use of sensors for real-time visibility that will allow for automating tasks or decision-making.



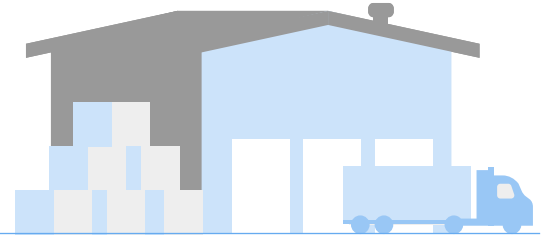
Latin America (LATAM)

- Decision-makers expect the highest growth in both number (**+44%** more facilities) and size (**+31%** more square footage) of warehouse facilities in the next five years.
- Today, more decision-makers are implementing innovative wearable computers and peripheral devices than any other region (**47%**). This lead is projected to continue, with **98%** expecting to implement these technologies within five years.
- **Ninety-six percent** of associates believe implementing warehouse technologies such as robotics and devices would help attract and retain workers, the highest of any region.

Asia-Pacific (APAC)

- **Nine in 10** decision-makers agree machine vision and/or fixed industrial scanning technology in key areas would save time and eliminate errors. Yet, only **one-quarter** say they are currently using or implementing these technologies.
- Decision-makers and associates differ in their assessment of the biggest challenge impacting their organization. **Seventy-eight percent** of associates rank fulfilling higher order volumes from increased e-commerce activity as the biggest challenge, while **74%** of decision-makers feel predicting inventory availability and confirming inventory accuracy are most challenging.

Key Takeaways



1 Market Pressures Become Catalyst for Positive Changes

Decision-makers agree they must implement new technologies to be competitive in today's on-demand economy, and they are accelerating timelines and increasing funding. Front-line workers say positive workplace changes are happening even amid labor shortages. They report improved working conditions and new technology to make their jobs easier, increased wages and bonuses, and more flexible work shifts due to new technologies.

2 Top Warehouse Challenges

Shipping volumes have increased **more than 20%** on average for both business-to-business and business-to-consumer orders since 2019. Increased e-commerce activity is challenging decision-makers with unpredictable customer demands, faster delivery times and the need for greater inventory accuracy. Operationally, returns management and several outbound fulfillment-related operations are challenging decision-makers.

3 Five-Year Technology Outlook for Warehouse Operations

Reducing unnecessary tasks performed by front-line workers is a priority for decision-makers and workers themselves. Both are concerned they will not meet their business objectives unless more technology investments are made to improve operations.

With labor optimization as an initiative for decision-makers, **64%** plan to augment workers with mobile devices or introduce collaboration with automation solutions in addition to mobility solutions to help ease the workload within five years. **Twenty-one percent** plan partial facility automation, while **10%** will fully automate their facilities. Only **5%** will continue to use paper-based or fixed workstations.

Today, **five in 10** decision-makers are utilizing mobility with some level of automated data capture, location solution, or predictive and adaptive data analytics. Within five years, **almost six in 10** are expected to be utilizing mobility with these sensor-based technologies, with more emphasis on automating decision-making and constantly predicting and adapting operations in real time.

ABOUT ZEBRA TECHNOLOGIES

Zebra (NASDAQ: ZBRA) empowers organizations to thrive in the on-demand economy by making every front-line worker and asset at the edge visible, connected and fully optimized. With an ecosystem of more than 10,000 partners across more than 100 countries, Zebra serves customers of all sizes—including 94% of the Fortune 100—with an award-winning portfolio of hardware, software, services and solutions that digitize and automate workflows. Zebra recently expanded its industrial automation portfolio with its Fetch Robotics acquisition and increased its machine vision and AI software capabilities with the acquisitions of Adaptive Vision and antuit.ai.