

2024 TREND REPORT

NAVIGATING CHANGE

4 Supply Chain Trends Impacting
Warehouse Management





Navigating Change

4 SUPPLY CHAIN TRENDS IMPACTING WAREHOUSE MANAGEMENT

Consafe Logistics

CONTENTS

INTRODUCTION	4
AI ADOPTION IS GROWING	6
DIGITAL TWIN – A NEW WAY FOR DIGITAL WAREHOUSE MANAGEMENT	16
THE RISE OF FLEXIBLE WAREHOUSE ROBOTICS	24
FOCUS ON SUPPLY CHAIN OPERATIONS	38
SPONSORS	49
CONTACTS	50
REFERENCES	51

INTRODUCTION

In an era marked by volatility and uncertainty, businesses in the supply chain must prioritize adaptability and forward-thinking. The events of the past year serve as a stark reminder of the importance of resilience and the ability to anticipate and respond to disruptions.

“SUCCESS WILL
DEPEND ON HOW
WELL COMPANIES
NAVIGATE CHANGE.”

Some of the challenges we face today in the supply chain industry require global cooperation, particularly in the area of sustainability, where we all have our “skin in the game.” Yet, with challenges come opportunities. Today, we have access to more knowledge and technology than ever before, equipping us to tackle these challenges with renewed determination.

In this report, we will explore 4 key supply chain trends and their impact on warehousing. We will shed light on the technologies, strategies, and best practices that will empower organizations to thrive in the ever-changing landscape of warehouse management.



4 Supply Chain Trends Impacting Warehouse Management

TREND #1

AI ADOPTION IS GROWING

If there's a single subject that has undoubtedly shaped conversations about our future recently, it's artificial intelligence. Not too long ago, on November 30, 2022, OpenAI released ChatGPT, an AI chatbot built on the company's large language models (LLMs). According to estimates, it took two months for ChatGPT to reach 100 million monthly active users, making it the fastest-growing application in history¹. Searches for the term "generative AI" skyrocketed, marketing departments all over the world took action, and today, we even have "future flavored" soft drinks co-created with AI.²

While the concept of artificial intelligence isn't new – in fact, it dates back to the 1950s³, its recent widespread accessibility has sparked a fresh wave of discussions regarding its capabilities and potential risks. A frequently asked question is, "Who will regulate it?"

Beyond its social implications, the adoption of AI in businesses is also on the rise. A recent IBM report revealed that 35% of companies used AI in their business in 2022, which is 4 percentage points higher than the previous year⁴. CEOs are facing



demands from multiple fronts, with over 60% reporting⁵ significant pressure from investors and board members to leverage

this transformative technology. Surveys also suggest that 64% of business owners⁶ anticipate AI to increase their productivity.

Positive impact business owners expect from AI

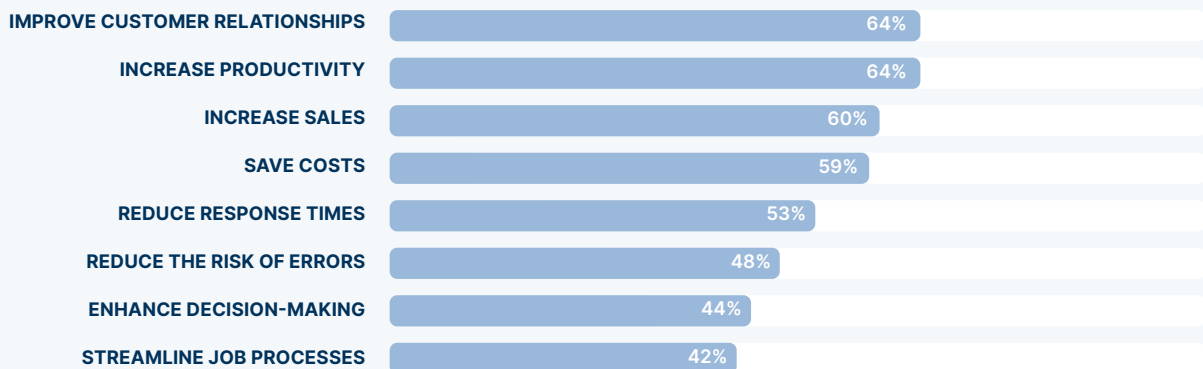


FIGURE 1 SOURCE: FORBES⁷

Interest in generative AI on Google searches from February 2022 to February 2023 worldwide, by week

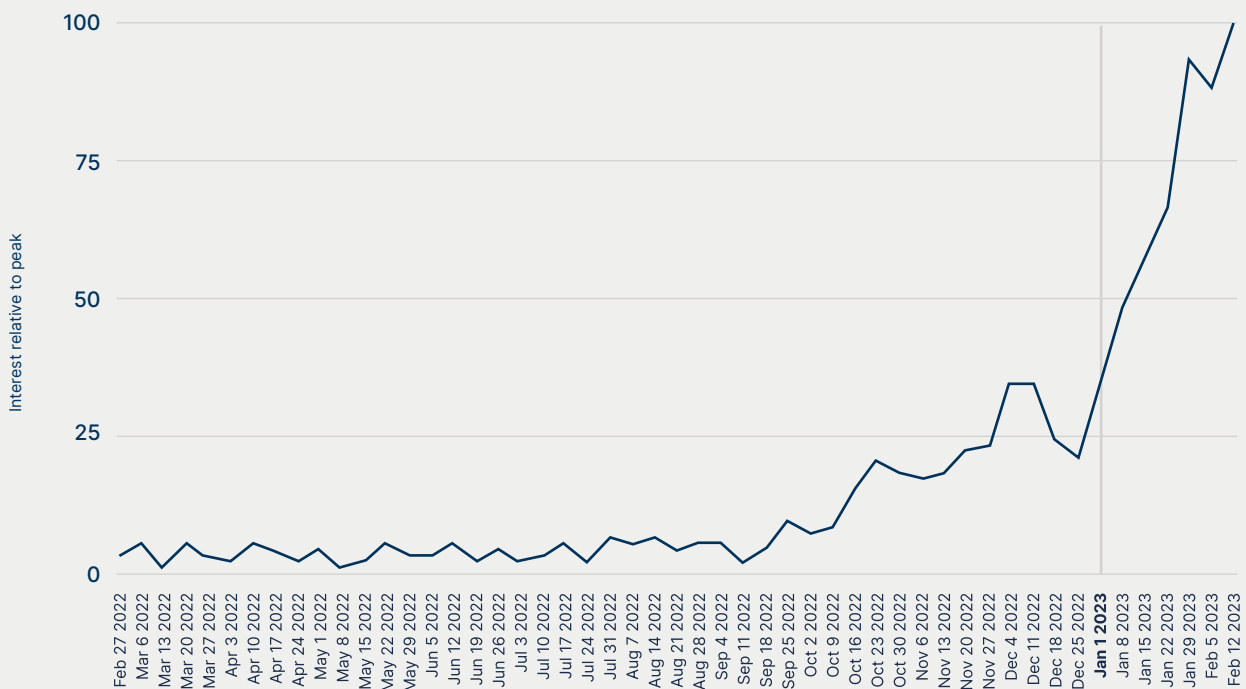


FIGURE 2 SOURCE: STATISTA⁸

While some view AI as the holy grail, others fear for the very existence of mankind. Nevertheless, it is evident that a technological revolution is unfolding before our eyes. It has the potential to reshape the warehousing landscape as well.

Today, we primarily employ AI for specific subprocesses in the warehouse. For instance, using algorithms to minimize packing material and shipping costs, or determine the shortest pick routes. However, this is just the beginning. We anticipate AI's next phase involving thorough recommendations for managing

the entire warehouse. For example, it could autonomously suggest inventory placements based on evolving demand or proactively identify and propose solutions for potential issues. All in all, we are confident that embracing AI will bring significant benefits to those who take the initiative.

TREND DRIVER

AI has become more affordable and profitable

Understanding why AI has become more cost-effective requires a journey into the world of transistors. AI devices often rely on powerful central processing units (CPUs), graphics processing units (GPUs), or specialized processors that integrate transistors to execute AI algorithms efficiently. Modern CPUs contain millions, if not billions, of transistors, a result of numerous technological revolutions. For example, Intel produced the world's first microprocessor in 1971, housing a mere 2,300 transistors. In contrast, by 2010, an Intel microprocessor contained a staggering 560 million transistors⁹.

As engineers discovered methods to shrink transistor sizes, their prices followed suit¹⁰.

CPUs and graphic processors, on the other hand, surged in power, paving the way for more efficient and robust computing. This has made it more feasible to develop and deploy AI applications on a broader scale, fueling research and investment in the technology. Stanford University recently reported that its AI-related courses have doubled over the past five years¹¹. Moreover, private investments in AI are anticipated to reach nearly US \$200 billion (EUR 183.5 billion) globally by 2025¹².

Private investment in AI was 18 times higher in 2022 than in 2013¹³



Private Investment in AI by Geographic Area, 2022

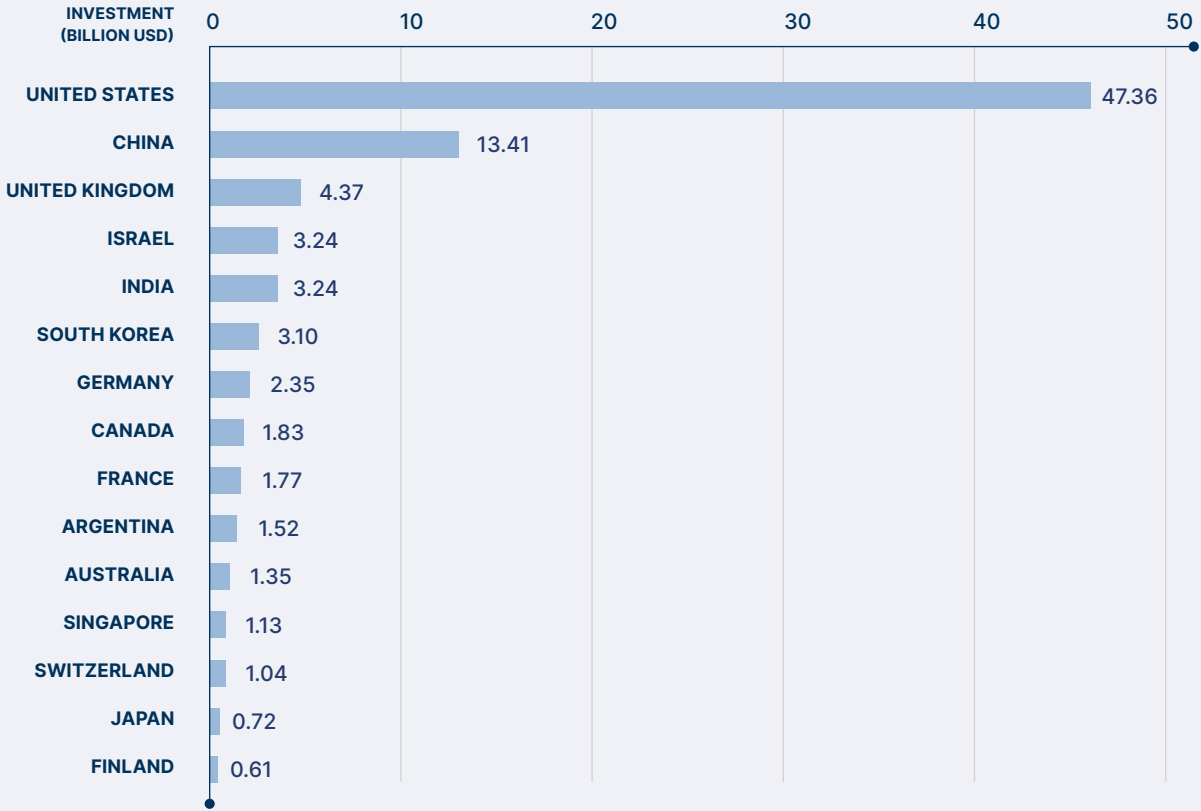


FIGURE 3 SOURCE: STANFORD UNIVERSITY, 2023 AI INDEX REPORT¹³



TREND DRIVER

The area of AI applicability has broadened

The scope of AI applicability has expanded significantly, encompassing a wide range of sectors and industries. Some key segments are:

Healthcare

AI can aid medical staff in early disease detection, personalized treatment plans, and the analysis of extensive medical datasets. Furthermore, according to more than half of Americans who perceive issues with racial and ethnic bias in healthcare, it could also address and mitigate such concerns.¹⁴

Finance

Financial institutions can utilize AI for fraud detection, algorithmic trading, and customer service automation (e.g., chatbots).

Manufacturing

AI-driven automation and predictive maintenance are optimizing production processes. For example, Pepsi uses AI technology to detect problems with manufacturing machinery before they cause breakdowns.¹⁵

Transportation

Autonomous vehicles and smart traffic management systems rely on AI to enhance safety and efficiency. For instance, Transport for London (TfL), the entity responsible for overseeing the UK capital's public transportation network and main roads, leverages AI to anticipate traffic disruptions. Since its inception, this initiative has saved over £100 million (€115 million) in lost travel time.¹⁶

In addition, AI is advancing in natural language processing, image and speech recognition, virtual assistants, and recommendation systems. These developments are reshaping how we interact with technology, establishing AI as a fundamental driver of innovation across various domains.

TREND DRIVER

Adoption has become easier

AI solutions are being designed to integrate seamlessly with existing software and processes, making it easier for organizations to adopt AI technologies across their business, including supply chain management. For example, AI modules today can be found in various software in the warehousing ecosystem, such as in transport management systems (TMS) or warehouse management systems (WMS).

Average number of AI capabilities organizations have embedded within at least one function or business unit



FIGURE 4 SOURCE: MCKINSEY & COMPANY¹⁷



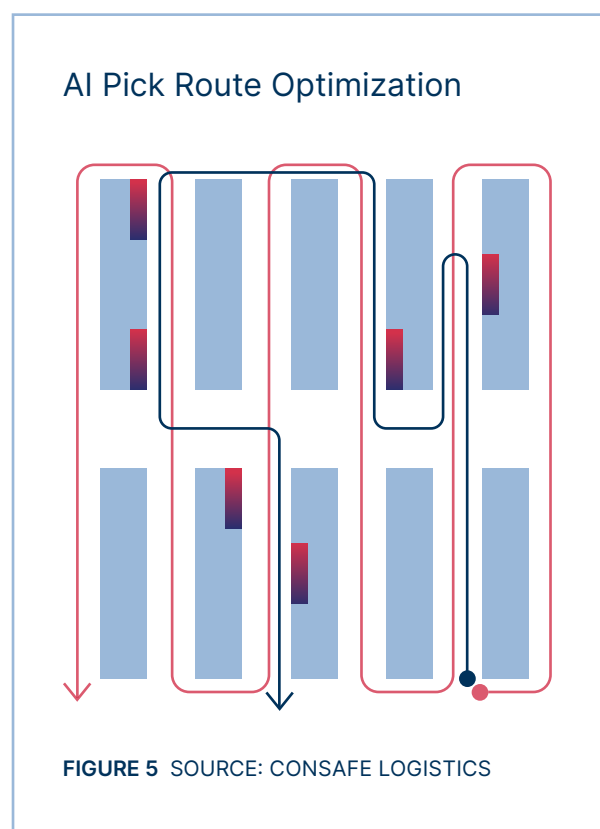
IMPACT ON WAREHOUSE MANAGEMENT

Machine learning and artificial intelligence offer a remarkable advantage in their capacity to handle vast amounts of data. And warehouses are data-rich environments. The questions which often arise are: “What can I do with my data? How can I use it to run more efficient operations?” The good point is AI doesn’t just handle data; it generates valuable insights. By analyzing massive datasets, it can identify patterns, trends, and opportunities that might escape human analysis.

A warehouse management system (WMS) serves as a crucial solution for integrating AI into warehouse operations. AI-driven functionalities within the WMS provide real-time insights, enabling warehouses to make informed decisions promptly. Here are three key areas of implication:

1. Efficient order fulfillment

An efficient order fulfillment process is paramount in today’s competitive business landscape. So, why not optimize pick routes? An AI-powered pick route optimization module within a WMS can intelligently re-sort pick routes, reducing their length by over 20%. This not only shortens order fulfillment times but also minimizes wear and tear on your forklifts, ultimately leading to lower costs and more resourceful operations.



2. Real-time decision making

In a fast-paced environment like a warehouse, achieving predictability in operations can significantly enhance efficiency. Consider replenishment activities, for instance. To prevent congestion during peak order picking periods, AI can predict and plan replenishment needs based on historical order patterns rather than relying on order-driven or watermark replenishment. This approach allows you to restock during periods of lower activity, contributing to improved workplace safety.

3. Data-driven insights

Nearly all warehouses encounter challenges related to storage capacity and available picking time. A WMS can help you address these issues with smart article association. By analyzing your customers' buying patterns with AI, the software can provide guidance on the optimal arrangement of products. For instance, if the analysis reveals that lime and cucumber are frequently purchased together in 45% of orders, it makes sense to store them in close proximity. This strategic placement of products can result in enhanced picking efficiency, reduced transport and forklift maintenance costs, decreased use of packaging materials, and an overall boost in sustainability within your warehouse.





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DO NOT DROP!



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4 Supply Chain Trends Impacting Warehouse Management

TREND #2



DIGITAL TWIN – A NEW WAY FOR DIGITAL WAREHOUSE MANAGEMENT

In 2021, the world experienced a record-breaking number of twin births. Studies now suggest that approximately 1.6 million twins are born on our planet each year.¹⁸

With their unique dynamic, twins have always fascinated movies, literature, and

pop culture. From heartwarming family drama to chilling thrillers, their duality represents a versatile and enduring concept in our cultural landscape, exploring themes of identity, connection, and sometimes even the supernatural. But apart from demographics and culture, twins are trending elsewhere, too.



In the world of technology and industry, we're seeing a different kind of „twin“ taking the spotlight—the digital twin. A digital twin is a virtual copy of a real object, system, or environment created using real-time data and smart simulations. It serves as a dynamic, data-driven mirror image, enabling businesses and industries to monitor, analyze, and optimize their assets and processes.

The technology's origins trace back to 1970, during NASA's challenging Apollo 13 mission¹⁹. In response to the crisis, NASA developed a mirrored system on Earth, replicating the spacecraft's conditions and real-time status. This strategic approach allowed engineers and astronauts to explore various solutions for the rescue operation. The term “digital twin” was first used in 2003 by American

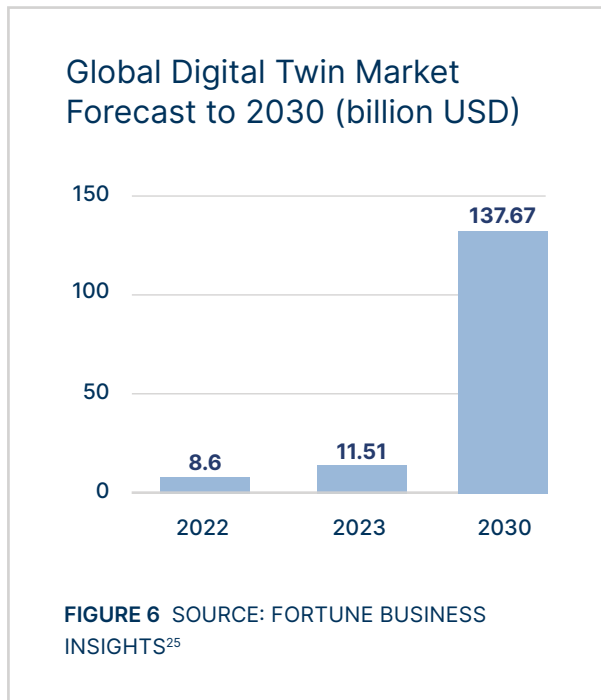
university professor Dr. Michael Grieves, who introduced the concept in relation to product lifecycle management during one of his courses²⁰.

Fast forward to nowadays, digital twins are used in many sectors, including construction, manufacturing, logistics, transportation, healthcare, and the energy industry. The growth of the global digital twin market is consistent, with projected expansion from US \$11.51 billion (EUR 10.5 billion) in 2023 to an estimated US \$137.67 billion (EUR 125.7 billion) by 2030.²¹

According to research²², 87% of corporate leaders recognize the growing importance of digital twins in fostering collaboration within strategic partnerships. 7 in 10 top-level technology executives in large enterprises²³ are now exploring and

investing in digital twins. Supply chain leaders are also actively involved. In a recent survey, 60% stated²⁴ that they are piloting or planning to implement a digital supply chain twin.

We believe that the versatile applications and significance of this technology will make digital twins an integral part of warehouse management. By leveraging digitalization, AI, and IoT, warehouses can be optimized in entirely new ways. Data-driven insights and predictive capabilities enable informed decision-making, creating a dynamic, agile, and resilient warehouse ecosystem that can adapt to the fast-paced demands of the 21st century.



“The global digital twin market is expected to grow approximately 12x times in size between 2023-2030²⁵”



Accelerating solution implementation

Time is money, goes the saying. And especially in today's business world, being quick to respond to change often means a significant competitive advantage. Companies operate in an increasingly complex environment: customer demands are constantly changing, and there are twice as many global disruptions (e.g., extreme weather events, geopolitical conflicts, cyberattacks, financial crises, etc.) than in 1980.²⁶

In this dynamic landscape, businesses need to be agile, and digital twins play an essential role in achieving that. Whether it's speeding up product development, improving warehouse operations through automation, or swiftly launching new solutions, digital twins help companies accelerate project implementation. By creating virtual prototypes, businesses can simulate, analyze, and fine-tune their ideas with remarkable speed.

For example, during a technology exhibition in the summer of 2023, Software République unveiled a groundbreaking concept car that was developed in just under 6 months²⁷ thanks to the use of a

digital twin. The twin played a pivotal role in modeling driver interactions and road infrastructure and enabling innovative features like unlocking the car using posture and facial recognition²⁸.

Another example is one of Italy's leading industrial coffee machine manufacturers, which uses a digital twin-driven development process to accelerate time to market²⁹.

Digital twins can also impact warehouse agility. In certain cases, they have been demonstrated³⁰ to reduce the implementation time for large projects by as much as 30%. Imagine a scenario where you are going to install a new automation solution in your existing warehouse setup and want to make sure you have no surprises regarding functionality and stability during the startup, to secure your investment will give you the expected results. Why not evaluate it within a fully emulated virtual environment? This approach not only shortens the testing period for the machinery but also allows your team to undergo training, ensuring they are well-prepared before the solution is deployed.

TREND DRIVER

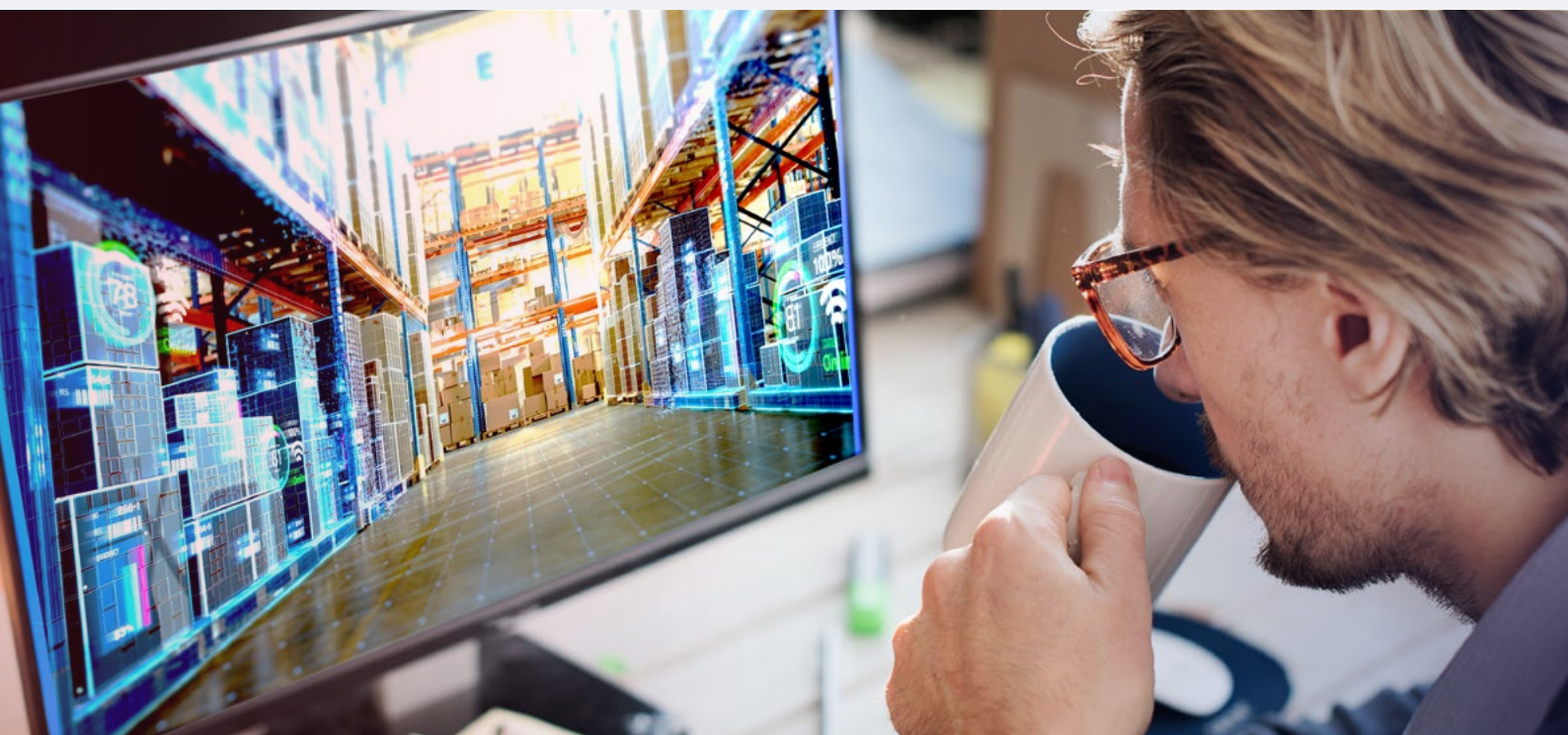
The need to make better decisions

In every business, decisions are the key to success. Good decisions depend on having the right information. But here's a typical problem: a recent survey found that 62% of companies have limited visibility into their supply chains³¹. How do you make decisions on limited data, then?

Studies reveal that around 41% of supply chain experts consider data analysis as their top priority when it comes to supply chain technologies³². Digital twins have emerged as a powerful solution to address this need. By providing a real-time and highly detailed replica of operations, they offer full visibility and equip decision-makers with a comprehensive view of current conditions and predictive insights into future scenarios.

The digital twin influences decision-making through simulation and testing capabilities as well. Businesses can explore new ideas, processes, and strategies in a virtual, risk-free environment. E.g., a digital warehouse design allows companies to experiment and learn from tests, resulting in efficiency enhancements of up to 20%-25%.³³ This invaluable data-driven perspective enables businesses to make smarter choices, mitigate risks, optimize resources, and stay agile in an environment where every decision counts.

“ A digital warehouse design can help improve efficiency by up to 20%-25%³³ ”



IMPACT ON WAREHOUSE MANAGEMENT

Two demands we often hear in relation to warehouse operations are that it should be speedy and predictable. But how can we achieve that? With the utilization of digital twin technology, we believe supply chain executives can take further steps along this path.

A modern warehouse management system (WMS) with a Digital Twin module can facilitate this process. Visualization, simulation, and emulation of available data in a secure virtual space allow you to unlock new opportunities for process optimization and enhance the predictability of warehouse operations. Here are three possible utilization areas:



1. Gain insights into warehouse performance with visualization

When it comes to managing warehouses, we often ask questions like, 'How well is my warehouse performing?' and 'Where can we make improvements?' The digital twin visualization module offers a comprehensive, real-time 3D overview of warehouse operations. This tool allows you to gain insights into areas that may have bottlenecks or where there is room for improvement without the need to be physically present in the warehouse.

The digital twin retrieves data for all manual processes directly from the WMS. For warehouse automation, it gathers information through your WCS/WES. Integrating data from these sources enables a holistic visualization of warehouse operations.

This integrated approach significantly enhances the overall supervision and management of your warehouse.

Ultimately, it can serve as a control tower solution, with all essential information accessible in one place, including powerful data analysis capabilities. This consolidated view not only facilitates a quicker grasp of complex operations but also enables taking more efficient actions when needed.



2. Support your decision-making with simulation

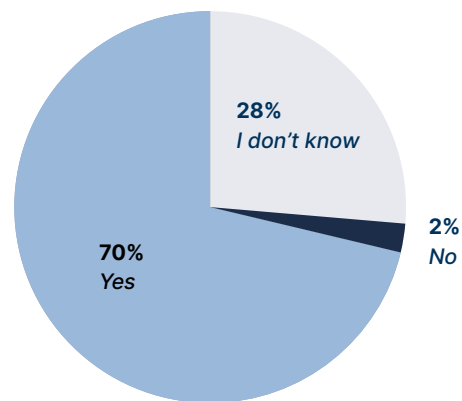
While visualization helps you understand where to look for improvements, simulation helps you assess the potential impact of your planned improvements before implementing them. This versatile tool allows you to test new warehouse layouts, processes, or functionalities without disrupting day-to-day operations.

Since the simulation tool is integrated into the WMS, it enables the seamless transfer

of the right data for testing. You can create 'what-if' scenarios and build cases to estimate the return on investment, gain valuable insights for forecasting, and make well-informed choices. During a poll question in one of our global webinars in 2023, 70% of respondents said that simulation with the digital twin would assist them in making the right decisions about new ideas.

Would a digital twin simulation module help you make the right decisions about new ideas?

FIGURE 7 SOURCE: CONSAFE LOGISTICS³⁴



3. Try your automation solution before the go-live with emulation

Global warehouse automation is set to double in the next four years³⁵, making the implementation of new automation projects more critical than ever. The question is: how can we ensure a smooth transition during the go-live phase?

The digital twin emulation tool allows you to thoroughly test the proposed solution without disrupting deliveries. You can detect issues, fine-tune the setup, verify

the hardware's suitability, and enable operators to familiarize themselves with the system before it goes live. By shortening testing periods and providing a predictable project rollout timeline, you can streamline the introduction of the new solution, reducing costs and enhancing efficiency. In addition, the test bench will be ready for future system upgrades and test runs.

4 Supply Chain Trends Impacting Warehouse Management

TREND #3



THE RISE OF FLEXIBLE WAREHOUSE ROBOTICS

Warehouse automation remains an enduring trend within the supply chain industry, with the global market size projected to surge from USD 22.15 billion (EUR 20.9 billion) in 2023 to nearly USD 47 billion (EUR 44.4 billion) by 2028.³⁶

As indicated by a recent study³⁷, logistics processes are now high on the agenda in many boardrooms, and the importance of

addressing supply chain and labor risks still fuels automation projects. Notably, the report suggests that companies are putting their words into action, potentially increasing budgets to mitigate these risks. Despite the growing accessibility of budgets for warehouse automation solutions, companies are more cautious about spending them. Recent global economic triggers have had a tangible impact on the financial health and



profitability of businesses. In 2022, Europe witnessed a surge in energy prices and inflation, reaching levels unseen in the past four decades³⁸. Households were disproportionately affected, with real

hourly wages declining in 22 out of 24 European countries from Q1 2022 to Q1 2023.³⁹ Consequently, retail trade volumes also fell.

Retail trade volume - annual comparison by retail sector (June 2023, compared with June 2022)

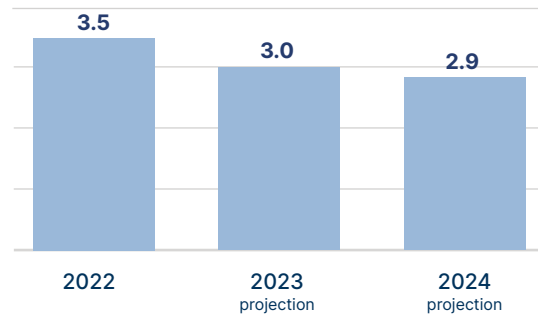
FIGURE 8 SOURCE: EUROSTAT⁴⁰

FOOD, DRINKS, TOBACCO:	-3.6%
AUTOMOTIVE FUELS:	-1.3%
NON-FOOD PRODUCTS:	-0.2%

While inflation has started to decrease in 2023, it will take some time for the full effects of this decline to become clear. Regarding the global economic outlook, the world's GDP is still slowing and is projected to persist in this trajectory into 2024.

Growth projections - World (real GDP growth, percent change)

FIGURE 9 SOURCE: IMF – WORLD ECONOMIC
OUTLOOK OCTOBER 2023⁴¹



So, while automation is still a desired way to improve warehouse operations, an increasing number of companies are adopting cost-effective strategies and turning to smaller, more flexible warehouse robotics solutions. We can also see with our customers that instead of focusing on large capital investments, many are now prioritizing the optimization of their existing warehouse infrastructure and launching projects with shorter Return on Investment (ROI) horizons. The need for a quicker ROI seems to be more prominent

among larger companies, as revealed in a recent survey involving over 1,000 supply chain professionals⁴².

Moreover, ongoing technological advancements in warehouse robotics provide adaptable and scalable solutions that can be integrated into existing operations. Gartner expects⁴³ that many companies already using mobile robots today will expand their fleets in the coming 3 years.





WHAT ARE THE MOST POPULAR ROBOTICS SOLUTIONS TODAY?

“

In the Nordic countries, AutoStore is a prevalent choice, known for its compact and high-density storage capabilities. It's commonly favored by businesses in the e-commerce sector.

In the global market, AutoStore is a common solution in most areas. However, Automated Guided Vehicles (AGVs) and Autonomous Mobile Robots (AMRs) have emerged as excellent entry-level warehouse robotics solutions. They are well-regarded for their adaptability and flexibility. They allow for customization and the integration of advanced technologies such as vision systems and lasers. Furthermore, they offer the ability to reprogram and relocate within the warehouse, enhancing overall operational flexibility.

As for traditional AS/RS and shuttle technology, they remain common for high-end requirements of large storage solutions and fast light-goods picking. But no matter which option you have chosen as your backbone automation setup, robotic picking solutions and cobots are also increasing in popularity. They aim to support human pickers, when possible, by handling products that can be efficiently picked by robots.

”



Claes Jönsson,
Automation Team Lead,
Consafe Logistics

In the field of innovation, humanoid robots are about to enter the market. Some studies suggest we will see these solutions spreading in factories between 2025 to 2028.⁴⁴ An illustrative example is Apollo, a robot revealed in August 2023 designed to perform physically demanding tasks in warehouses.⁴⁵ Its developers plan to start commercial release by the end of 2024.⁴⁶

Global Humanoid Robot Market Size, 2023-2032 (projected, USD Billion)

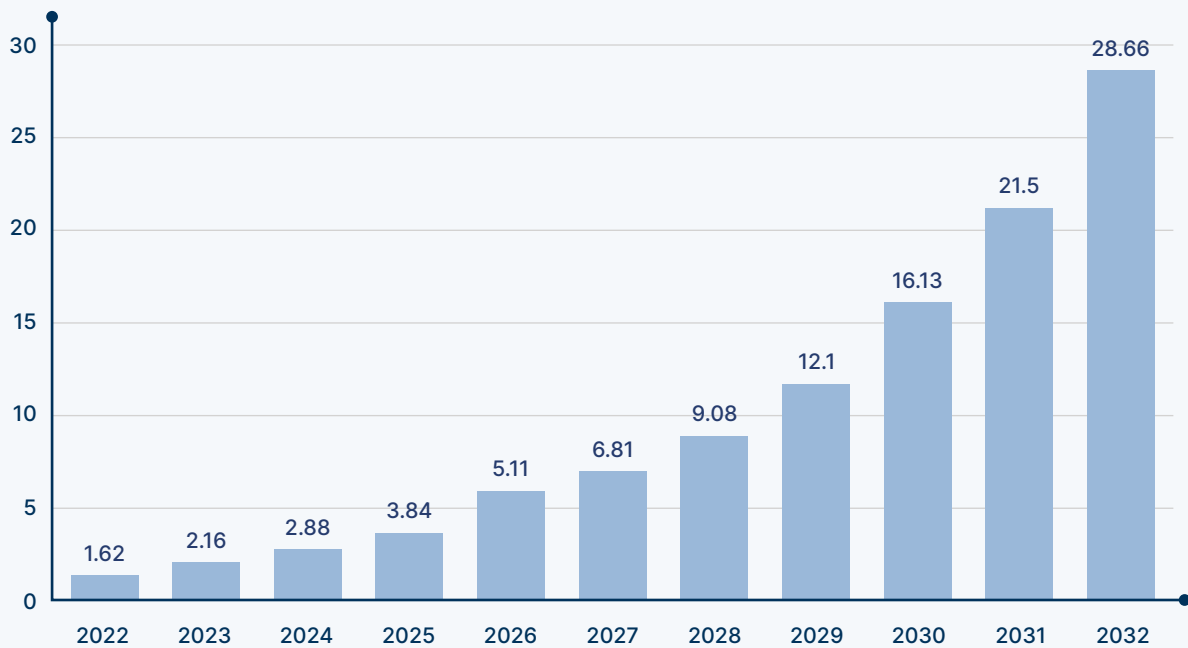
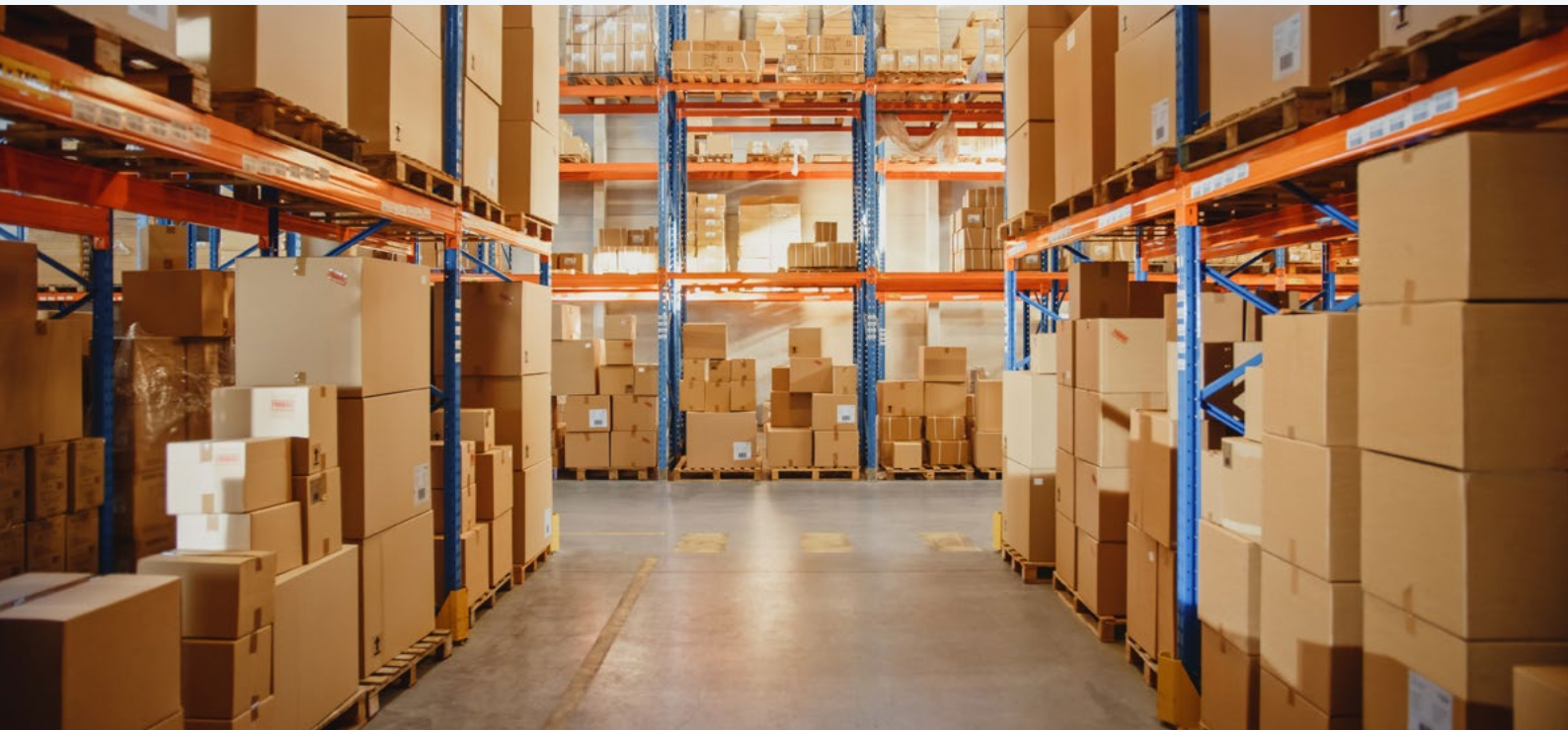


FIGURE 10 SOURCE: PRECEDENCE RESEARCH⁴⁷



TREND DRIVER

Scarce warehouse labor

The backbone of any warehouse operation has always been its workforce. Finding and retaining skilled labor in the industry, however, is an ongoing challenge. Staffing shortages range from 10% to 25% in the market⁴⁸, with the most significant labor gaps reported in the roles of material handlers (34%) and forklift drivers for pallet movement (31%)⁴⁹.

This scarcity serves as a key catalyst for the adoption of automation, driven by the need to meet current business demands and to prepare for future scenarios.

Organizations anticipate⁵⁰ that in the long term, they might run out of workers willing to engage in the repetitive task of picking cartons and cases all day to fulfill orders. By automating material handling, robotics can help reduce the reliance on human labor, allowing employees to focus on more strategic and value-added activities. One of the primary goals of Apollo's development, for example, is to alleviate labor shortages⁵¹.

“ Staffing shortages range from 10% to 25% in warehouses⁴⁸

”



TREND DRIVER

E-commerce and omnichannel operations

The second driver behind the rise of warehouse robotics is the ongoing e-commerce revolution. Projections indicate that global e-commerce sales will continue to grow in 2024, exceeding USD 6 trillion (EUR 5.6 trillion)⁵². It is estimated that by the beginning of 2024, approximately one in three individuals in the global population⁵³ will be shopping digitally.

E-commerce sales by country, 2023 (USD Billion)

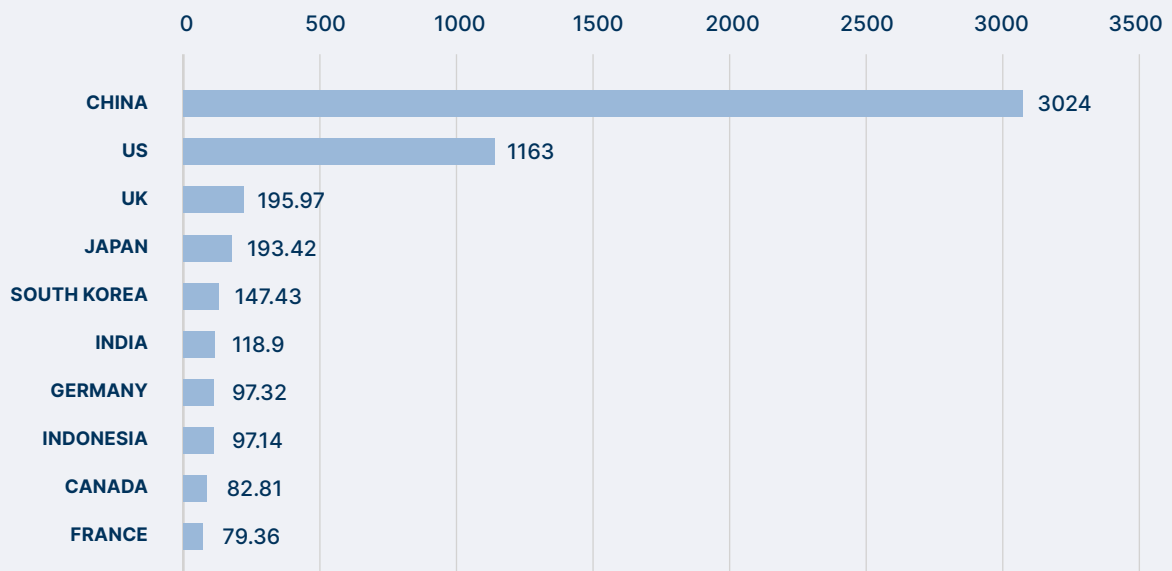
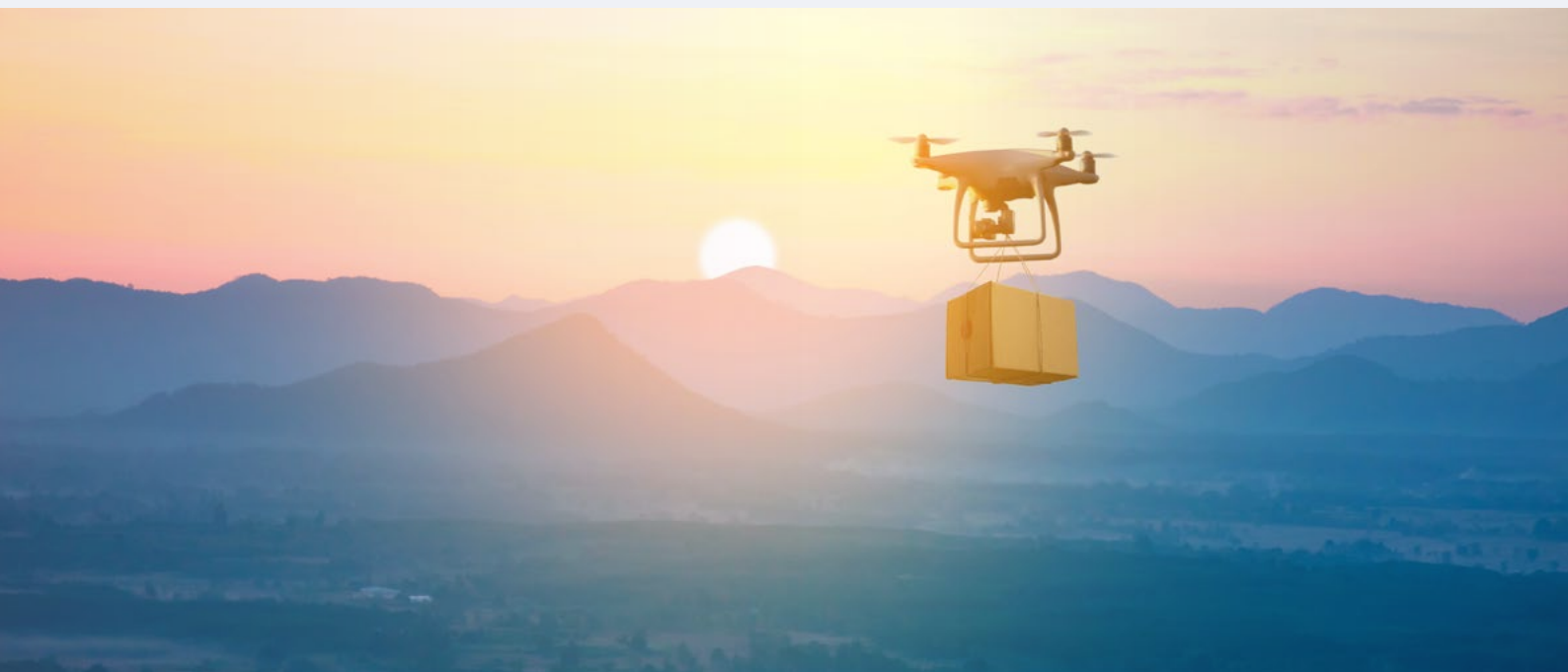


FIGURE 11 SOURCE: OBERLO⁵⁴



The surge in direct sales to customers and the demand for just-in-time delivery has reshaped warehouse operations. Historically, automation primarily relied on buffer solutions, and manual labor played a key role in the picking process within the warehouse. Automated picking to fulfill customer orders was a rare occurrence.

Today, warehouses need to:

- ▶ Store a higher number of SKUs.
- ▶ Pick more lightweight items.
- ▶ Operate omnichannel distribution, with more frequent shipping to both stores and end customers.
- ▶ Deliver fast and efficient last-mile logistics⁵⁵.

This transformation is driving the adoption of warehouse automation, with a particular emphasis on fast-picking solutions tailored for handling lightweight items. Companies are also seeking flexibility to address ongoing changes in product SKUs and order varieties⁵⁶ and are prioritizing solutions that offer scalability and rapid implementation⁵⁷.



IMPACT ON WAREHOUSE MANAGEMENT

Introducing warehouse automation is a complex task with many angles to consider. It raises a fundamental question: should you go all-in with automation, or could that limit your flexibility too much? There's no one-size-fits-all answer, as

different companies and industries need different approaches. Nevertheless, one universal truth prevails: thorough preparation is crucial. To help guide your decision, here are five important questions to think about:

1 Do you have the necessary knowledge to make the optimal decision?

As the world of warehouse automation grows more complex, knowledge is a significant barrier to adoption.

“Knowledge of how to implement systems” reported as a bottleneck to automation adoption by sector

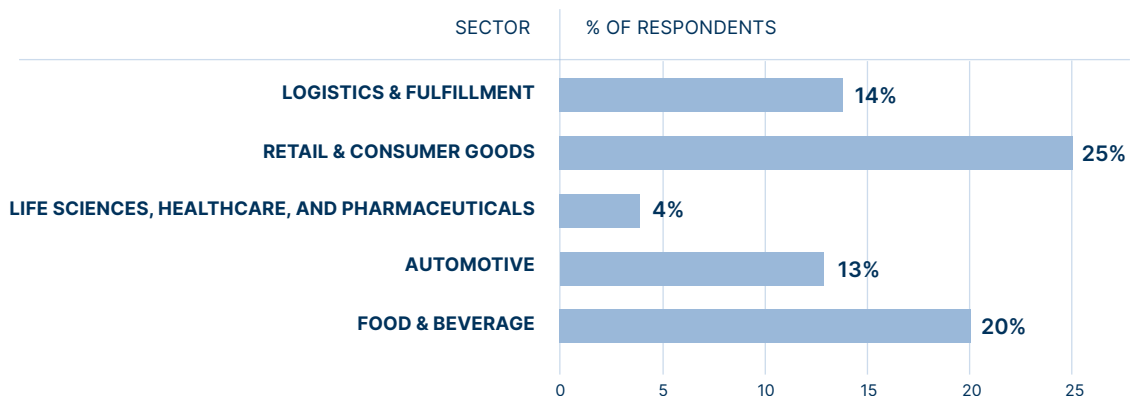


FIGURE 12 SOURCE: MCKINSEY & COMPANY⁵⁷

The right advisory and implementation partners can help you navigate the evolving landscape of warehouse robotics. They bring valuable insights and experience to the table, ensuring that your automation solutions align with your specific needs and goals.

2 Will the solution support your current and future needs?

While it may appear straightforward, this question requires careful consideration. Let's examine a real-world example: one of our customers implemented the same automation solution in different warehouses. One of these sites handled large orders for stores but also processed next-day deliveries for end customers. Meeting both demands, however, was not feasible with the solution purchased. Items

became 'trapped' within the machinery, causing delays. Eventually, they had to change how they worked to fit the automation's limits.

Therefore, a comprehensive analysis serves as a safeguard against potential complications and inefficiencies, ensuring that your operations can adapt to evolving requirements without encountering bottlenecks or unforeseen limitations.



3 Can the solution be easily integrated into your warehouse ecosystem?

To fully leverage the benefits of warehouse robotics, it's crucial that the solution integrates smoothly with your existing warehouse operations. This becomes even more critical if you're planning to implement or already have multiple automation solutions within your warehouse. In this context, the Warehouse Control System (WCS) assumes a pivotal role. WCS software orchestrates the tasks of robots, eliminating the need to manage islands of automation.



Next, you should carefully consider where to centralize the decision-making logic for all processes. Our recommendation is to maximize efficiency by placing decision-making in the Warehouse Management System (WMS), which can harmonize both manual and automated processes. This setup fosters flexibility and enables swift expansion to multiple sites while also simplifying support and maintenance. You can learn more details about system integration setups and underlying dynamics in our [2023 Trend Report](#) or watch our on-demand [webinar](#), 'How to Avoid Islands of Automation.'

4 Is the solution flexible and scalable?

Running flexible warehouse operations is now imperative for long-term success.

To address this effectively, consider the following points:



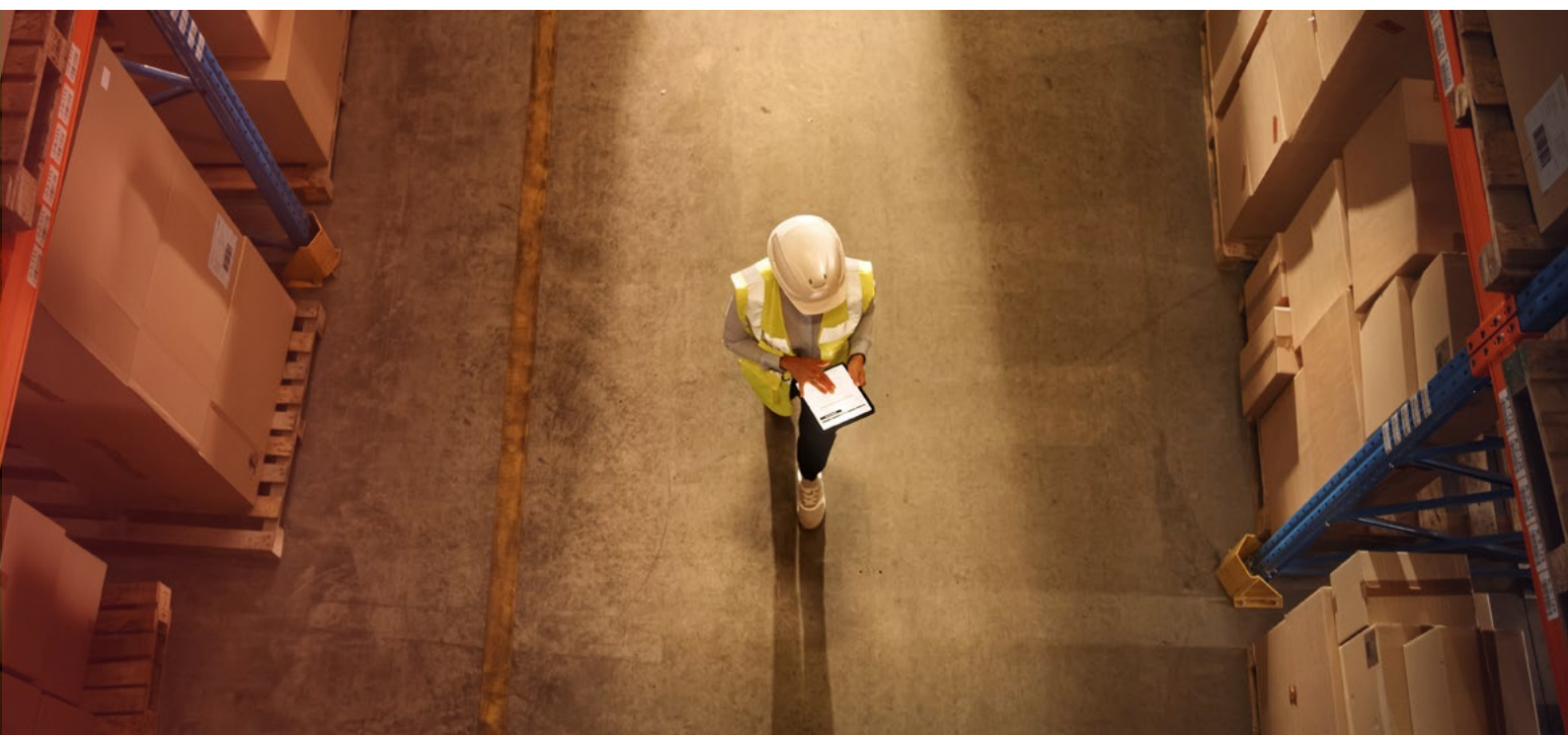
Begin with a small-scale automation of a specific warehouse area: Identify the section that promises the most significant benefits. This approach allows for gradual expansion as needed, ensuring that automation aligns with the growth of your operations.



Evaluate whether the chosen solution is movable or adaptable: Warehouse requirements can evolve over time, so assess the solution's capacity to be moved or expanded should you require a larger warehouse in the future.



Explore innovative cost models: Instead of committing to a permanent investment to handle occasional peaks, like those seen during events like Black Friday, consider the option of renting automation solutions such as robots or AGVs for specific high-demand periods. Robotics as a Service (RaaS) also presents a practical alternative. RaaS enables you to experiment with various robotic solutions, gaining valuable insights into what works best for your warehouse. In a recent survey⁵⁹, 84% of respondents expressed that RaaS could accelerate the adoption of automation solutions.



5 Is your team ready to embrace change?

The successful implementation of new warehouse automation heavily relies on your team's acceptance and cooperation. Warehouse workers have mixed feelings regarding these technological advancements. Concerns revolve around job security, insufficient training, and technology malfunctions that cause disruptions in the warehouse⁵⁹.

However, they also recognize the potential of warehouse robotics in easing their workload and making it safer. Surveys show⁶⁰ that 81% of workers believe that AMRs could reduce job stress, while 78% feel their work would be more enjoyable with less walking.

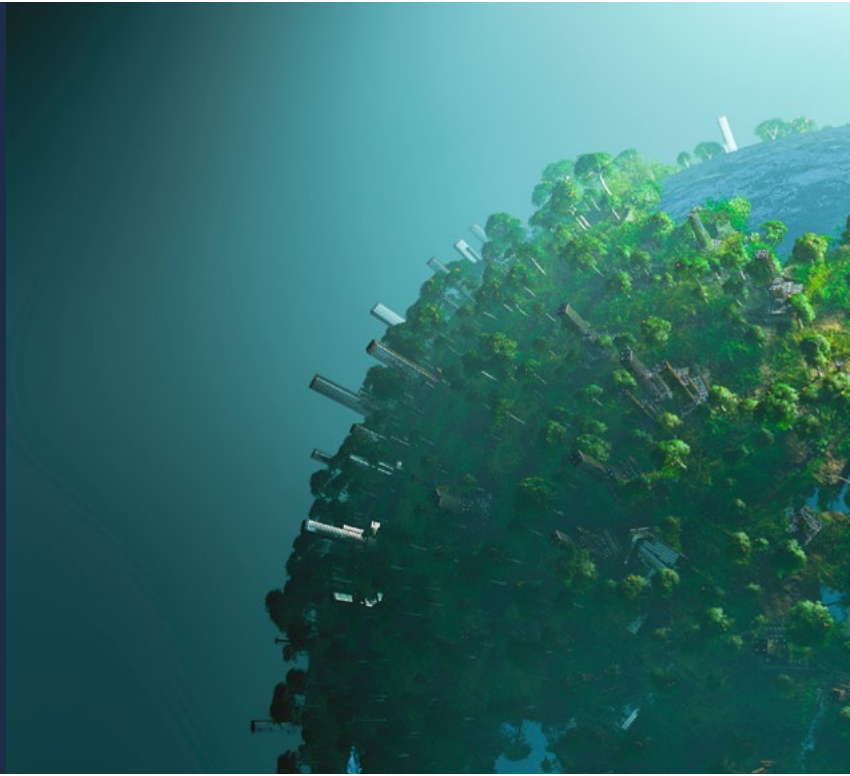
In conclusion, it's crucial to take into account the employee perspective and address concerns comprehensively.





4 Supply Chain Trends Impacting Warehouse Management

TREND #4

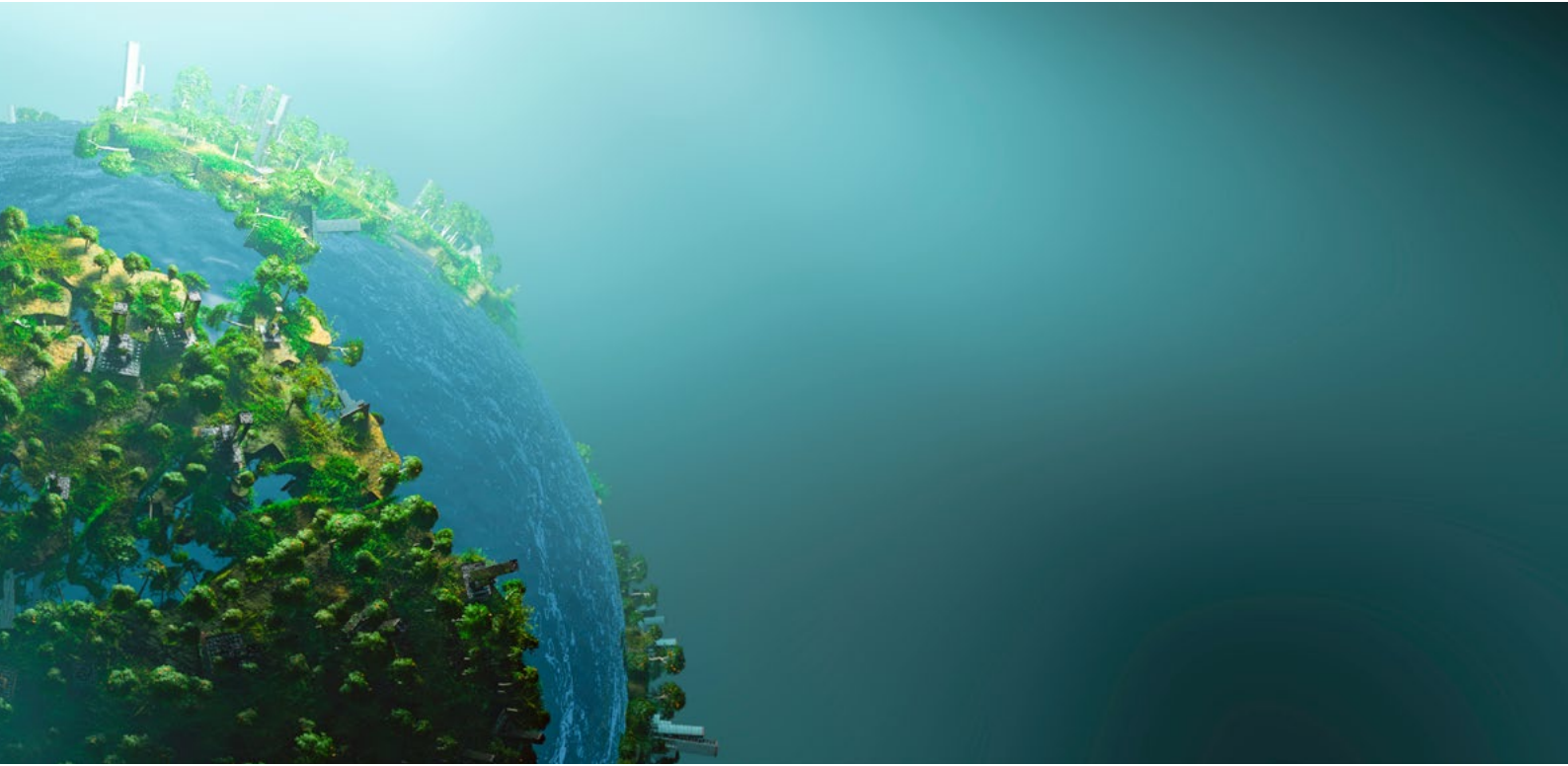


FOCUS ON SUSTAINABLE SUPPLY CHAIN OPERATIONS

Over 90% of an organization's greenhouse gas emissions are linked to its supply chain⁶¹. So, to reduce our impact, we must prioritize making it more sustainable.

This imperative is mirrored in a growing number of regulations worldwide. For instance, a wind of change is on the horizon for businesses in the European

Union. With the Corporate Sustainability Reporting Directive (CSRD) now in force⁶², companies must apply new reporting rules starting from their 2024 financial year reporting. What this means in practice is that it will be obligatory for almost all businesses within the EU to report on their environmental, social, and governance KPIs, following specific standards. Due to new legislation, for example, Nordic e-commerce company Boozt will need to report on more than 400 KPIs⁶³.



WHAT IS WHAT? - EU Regulations Explained

Corporate Sustainability Reporting

Directive (CSRD): A law enacted by the European Union. It requires a broad range of large companies and listed SMEs to report on their sustainability efforts, covering environmental, social, and governance aspects.

European Sustainability Reporting

Standards (ESRS): These standards offer detailed reporting rules under the CSRD, ensuring consistency across the EU.

EU Green Claims Directive (EGCD):

This directive regulates companies' environmental claims to prevent greenwashing.

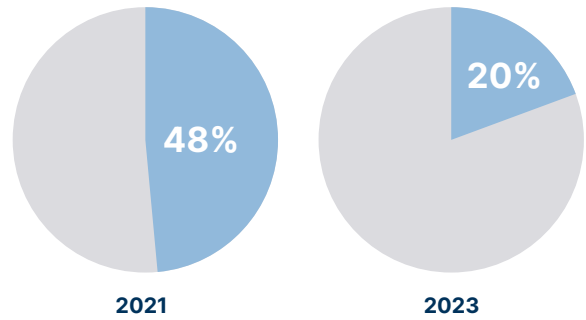
Corporate Sustainability Due Diligence

Directive (CSDDD): This directive aims to enforce mandatory due diligence for companies in the EU. It holds them accountable for social, environmental, and governance issues within their supply chains.

Stricter laws are paired with customers' eroding trust in corporate sustainability statements, as shown in Figure 13.

Consumer Trust in Corporate Sustainability Statements

FIGURE 13 SOURCE: IBM INSTITUTE FOR BUSINESS VALUE⁶⁴



This decline signals a need for companies to adopt sustainable practices and do so with transparency and authenticity. The EU’s Green Claims Directive aims to streamline data communication, a move expected to also enhance customer trust. Non-compliance, such as failing to support environmental claims with verifiable data, could result in fines. Companies making false claims may face penalties of up to 4% of their annual turnover.

No wonder that CEOs feel the pressure. In a recent survey⁶⁵, they identified environmental sustainability as their top challenge in the next three years.

However, sustainability is not just about environmental stewardship. It’s a concept that includes economic and societal aspects as well, and we see that each has a profound influence on supply chains worldwide.

- **Economically**, recent disruptions, like the COVID-19 pandemic, geopolitical conflicts, and high energy prices, have shown how fragile supply chains can be. In addition, a growing number of cyber-attacks target digital infrastructures. Collectively, these events have posed substantial challenges to the economic sustainability of companies.

- **Societally**, the already mentioned warehouse labor shortage and retention issues are critical. Furthermore, the evolving landscape of technology, including the integration of warehouse robotics and advanced automation, significantly impacts warehouse workers, altering job roles and demanding new skill sets. These changes prompt crucial questions about how to ensure a safe and healthy workplace environment while also addressing employees’ overall well-being.

Today's supply chains require robustness that can only be achieved by building more sustainable operations in all three aspects. We strongly believe that to solve these complex problems, different industries need to work together. Sharing data and best practices across sectors is essential, as sustainability is a collective responsibility. With upstream and downstream reporting criteria affecting most businesses in the supply chain, it's clear that we are all stakeholders in this journey.

“ Sharing data and best practices across sectors is essential, as sustainability is a collective responsibility. ”



TREND DRIVER

Meeting global climate standards

Global treaties on climate targets, such as the legally binding Paris Agreement⁶⁶, or regional directives, e.g., the European Union's CSRD, urge companies to take proactive measures to reduce their environmental impact. Sustainability is no longer just a choice but a business imperative. As regulators demand ever-more detailed reporting on supply-chain carbon emissions, the key to improvement lies in measurement.

In supply chains, transportation is a significant contributor to carbon footprints. From 1990 to 2022, transportation emissions demonstrated an average annual growth of 1.7%, outpacing the increase seen in nearly all other sectors⁶⁷. nShift, the global leader in delivery management, introduced an emissions tracker tool to help its customers measure the carbon footprint of their shipping activity.

THE KEY TO IMPROVEMENT LIES IN MEASUREMENT

“ Customers often have limited awareness of how their transport planning affects their carbon footprint. With Emissions Tracker, you gain insights into the CO2 emissions associated with the transportation of your entire supply chain. No matter which carrier you opt for, the tool's unified calculation method allows performance comparisons. It provides comprehensive reports and makes it easier for you to set benchmarks and targets, which the CSRD also fosters. ”

Fredrik Lindhagen
Product Director
nShift

TREND DRIVER

Cyberattacks disrupting operations

Cyberattacks pose a significant risk to a business' economic sustainability. In 2023, 48% of companies reported⁶⁸ an increase in such incidents. These attacks disrupt operations, cause reputational damage, and impact finances. For example, on average, a cyber breach now costs companies around USD 4.35 million (EUR 4 million)⁶⁹. As a result, supply chain professionals regard cybersecurity incidents and data breaches as the top threats to the industry in the coming years.⁷⁰

However, a significant challenge for many businesses is the scarcity of cybersecurity professionals in this field - 66% of security leaders struggle to hire suitable talent for their organizations⁷¹.

The surge in incidents and the shortage of staff to address them highlight the necessity for a resilient approach, prompting a shift towards more sustainable operations.

Top Five Security Skills Organizations Need

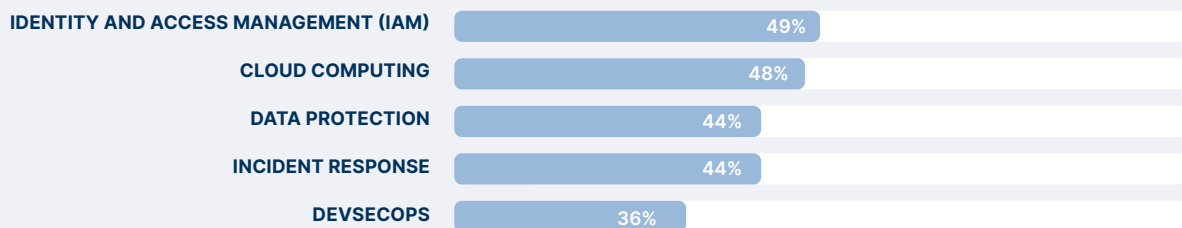


FIGURE 14 SOURCE: ISACA⁷²

TREND DRIVER

Workforce productivity

Just like a ship without its crew, a warehouse cannot navigate its operations without its human workforce. Yet, two critical issues significantly hinder warehouse performance:

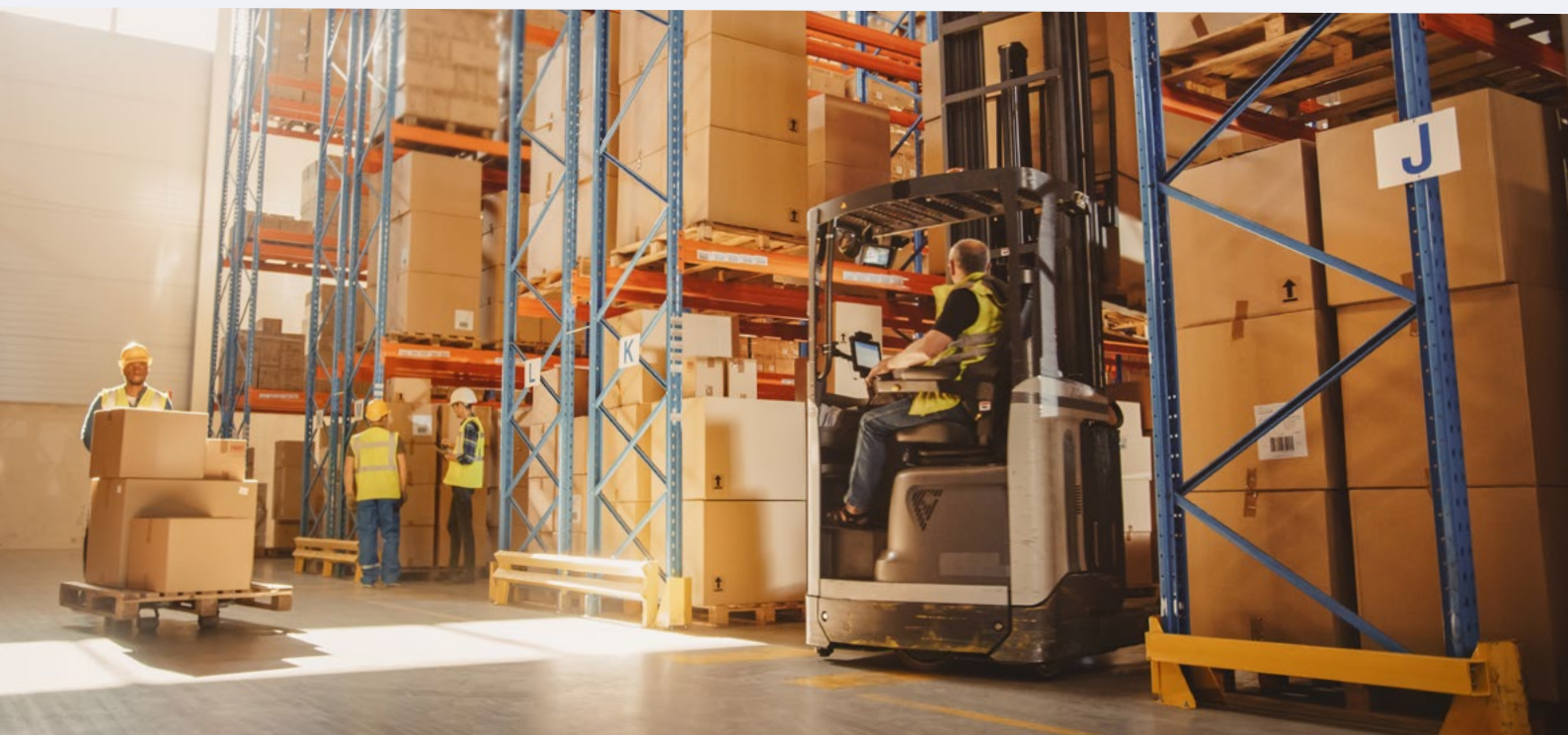
- **Lack of employees:** Labor shortages create disruptions, especially during peak seasons. A study found⁷³ that 55% of warehouse and logistics professionals see more employees missing work in these hectic periods because of extra stress and workload.
- **Lack of engagement:** Globally, only 23% of employees are engaged at work⁷⁴, despite the pivotal role a productive workforce plays in ensuring a company's long-term success.

Acknowledging the significant impact of employee well-being on overall performance, many businesses are now prioritizing initiatives to enhance employee welfare and create a more sustainable workplace.

Top 3 Labor Initiatives in the Warehouse

- 1 REDUCE UNNECESSARY TASKS SO FRONTLINE WORKERS CAN FOCUS ON CUSTOMER-CENTRIC WORK**
- 2 OPTIMIZE THE USE OF TEMPORARY/ SEASONAL LABOR**
- 3 ADDRESS WORKER COMFORT AND ERGONOMICS**

FIGURE 15 SOURCE: ZEBRA⁷⁵



IMPACT ON WAREHOUSE MANAGEMENT

When we talk about making warehouse management better today, sustainability is an essential part of the conversation. Meeting global climate standards is now non-negotiable, and warehouses must reassess their operations accordingly. Simultaneously, as businesses increasingly integrate digital processes, safeguarding your warehouse data from cyber threats becomes paramount – there is no time for downtime. The persistent challenge of recruiting and retaining workers adds another layer of complexity.

So, what strategies empower warehouses to thrive in this environment? How can we provide a better workplace for employees? And what can we do here and now to address these challenges? In our view, a WMS can be a tool for multiple steps in the right direction. Here are 4 methods for fostering more sustainable warehouse operations:

1 Securing compliance with dangerous goods handling

Many warehouses routinely manage hazardous goods as part of their daily operations. A WMS can provide up-to-date instructions on labeling and tracking activities so you can comply with the latest rules and regulations.



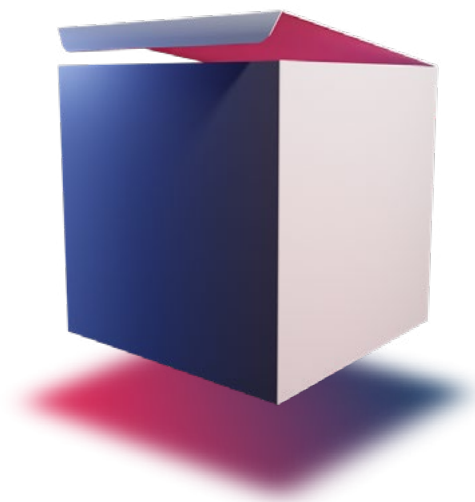
2 Creating sustainable work schedules

Nobody enjoys wasting their time or being called in for last-minute shifts. A WMS can help you provide your staff with a more structured and efficient schedule. Leveraging historical data from the system, combined with AI algorithms, the software forecasts future workforce requirements up to 12 weeks in advance. These insights enable you to effectively minimize labor expenses and establish a more sustainable workplace for your team.



3 Using Smart Box Calculation

Another way to minimize your environmental footprint is by ensuring accurately sized packages for each shipment. A WMS, equipped with AI capabilities, can calculate the most suitable box sizes, factoring in dimensions, material costs, and transportation expenses.

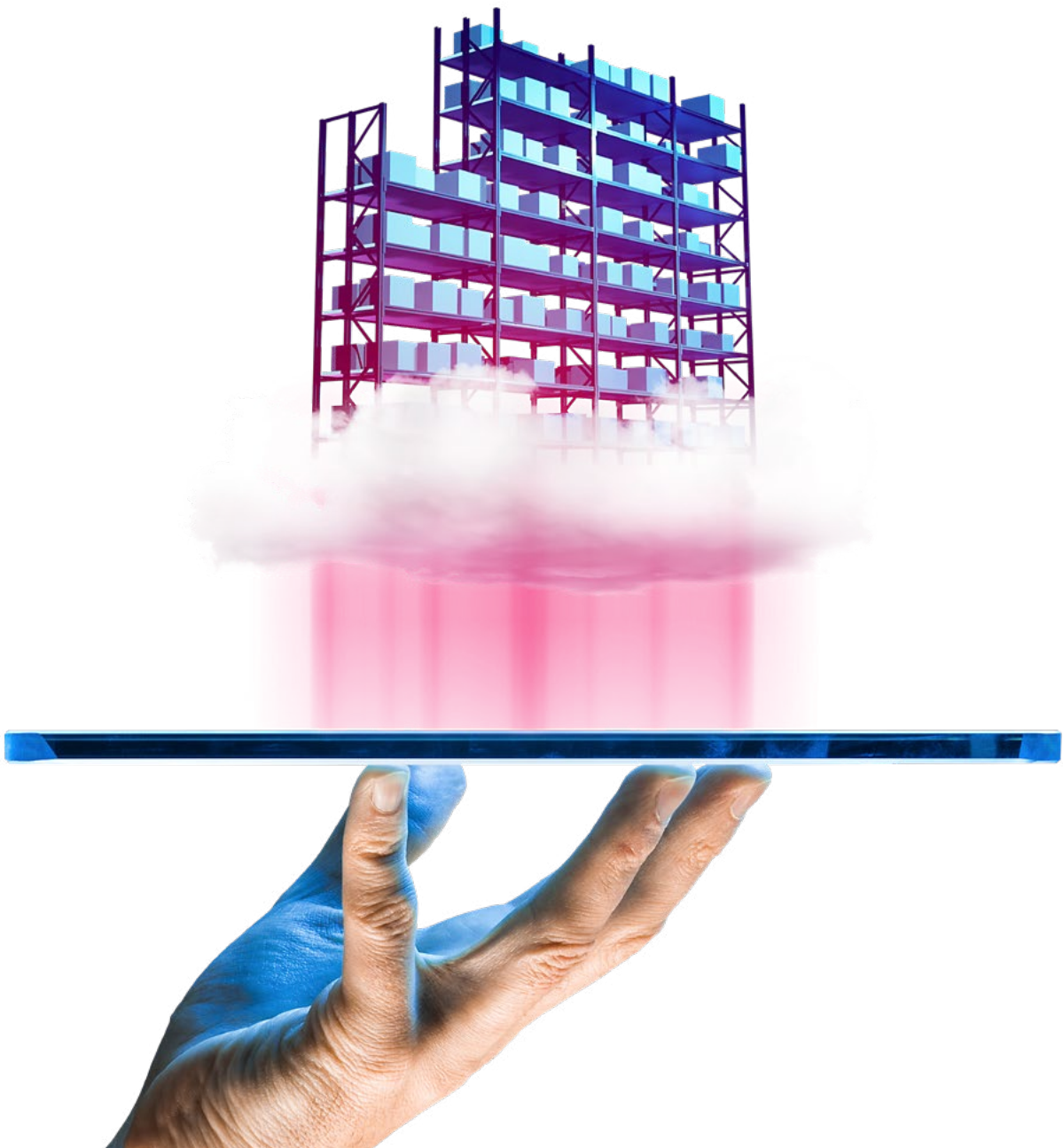


4 Deploying your WMS as Software-as-a-Service (SaaS)

As sustainability takes center stage, the impact of energy usage becomes a critical consideration in the warehouse – and software deployment is no exception. Rather than running your WMS system on-premises on your own servers, consider hosting it in the cloud. Microsoft states⁷⁶ that its cloud platform can be up to 93% more energy efficient and 98% more carbon efficient than on-premises solutions. In addition, leading cloud providers like AWS, Google, and Microsoft

aim to shift their operations to 100% renewable energy by 2025-2030. This emphasizes SaaS as a promising avenue for aligning with sustainability objectives.

Deploying your WMS in a SaaS delivery model also transfers information security responsibilities to the WMS vendor. This minimizes the need for specialized IT security personnel and frees up resources that you can use to meet your customers' needs.





SPONSORS



About nShift

nShift is the global leading provider of cloud delivery management solutions enabling frictionless shipment and return of almost one billion shipments across 190 countries annually. nShift's software is used globally by e-commerce, retail, manufacturing and 3PL shippers. The company is headquartered in London and Oslo. It has over 500 employees across offices in Sweden, Finland, Norway, Denmark, United Kingdom, Poland, the Netherlands, Belgium and Romania.

PROGLOVE

About ProGlove

Founded in 2014, ProGlove provides smart wearable scanner solutions that fuel a continual stream of worker-driven productivity gains. More than 2,000 global industrial customers trust in ProGlove's innovations. Organizations deploy them to optimize worker experience, maximize uptime, and get more done with existing teams. The company's hard- and software solutions augment the boots on the ground and promote human-machine collaboration. This brings speed, accuracy, guidance, and ergonomics to the shopfloor workers. Thus, ProGlove's wearable tech solutions provide organizations with unique shopfloor and device data points. This powerful combination of soft- and hardware enables significant process optimizations, error reductions, and worker well-being enhancements. Pioneers and innovators of all sizes in automotive, manufacturing, retail, and logistics rely on ProGlove. Users report productivity gains of up to 20 per cent and up to 33 per cent fewer errors. With each scan, they can leverage time savings of up to 6 seconds per scan. ProGlove's customers include organizations such as BMW, DHL, Gap Inc. and Lufthansa Technik Logistik Services. The wearable tech pioneer employs more than 350 people from over 30 countries with offices in Chicago (US), Coventry (UK), Munich (Germany), and Belgrade (Serbia). More information is available at www.proglove.com.

CONTACTS

This Trend Report was conducted and authored by Consafe Logistics in January 2024. If you want to learn more about warehouse management and our solutions, do not hesitate to contact us at consafelogistics.com.

About Consafe Logistics

Consafe Logistics is a software development company. We design products and technologies that make warehouse operations of logistics and supply chain companies smarter, more effective, and thus more sustainable. The Consafe Logistics Group has 450+ employees who support our global clients from seven European countries – Belgium, Denmark, Finland, The Netherlands, Norway, Poland, and Sweden. Our headquarters is located in Lund, Sweden.

Headquarters

Consafe Logistics AB
Hedvig Möllers gata 12,
223 55 Lund, Sweden
+46 46 280 04 00

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