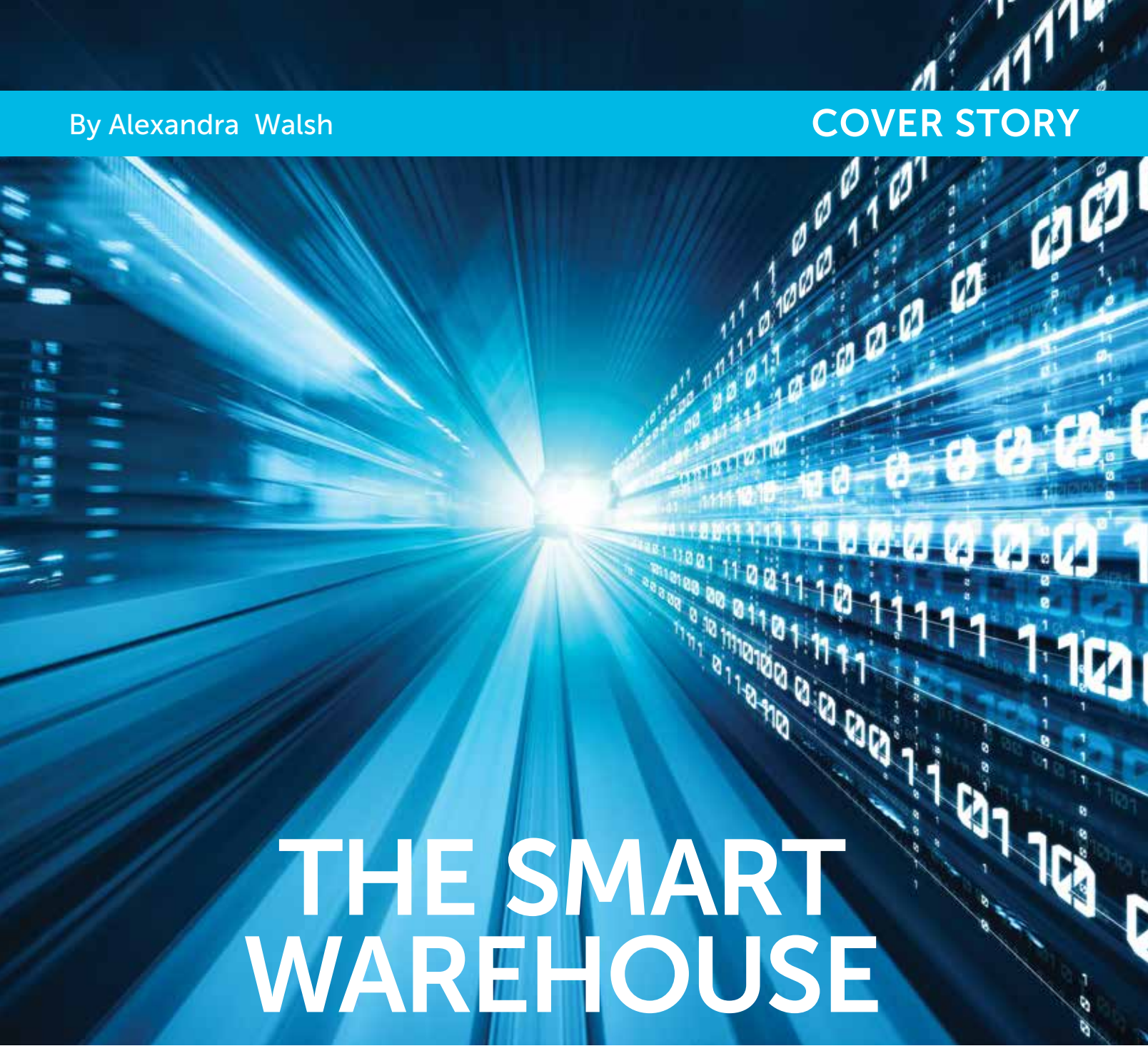
By Alexandra Walsh



THE SMART WAREHOUSE

AI promises greater efficiencies and ROI in cold chain logistics.

Artificial intelligence (AI) has the potential to transform many industries and businesses, and temperature-controlled warehouses are no exception. AI has been forging its way into the world of logistics and supply chain management, bringing with it a wide range of benefits that can help companies optimize their operations, increase efficiency, reduce costs and improve customer satisfaction.

Labor Shortages and Worker Efficiencies

AI will impact labor shortages and worker efficiency and safety affirms Kaushik Sarda, Senior Director of Supply Chain Solutions, Americold.

"AI will help evolve on-floor operations in several ways, from helping with scheduling activities, such as labor planning/modeling tools, to increasing efficiencies in the building by allowing optimization of work (reducing travel times by predicting and directing work activities)," Sarda says. "Computer vision technology powered by machine learning will also increase safety."

Bobby Kareer, Senior Director of Software Engineering at United States Cold Storage, believes software systems that offer directed task management have the potential to improve efficiency and reduce the labor requirements for the many operational processes in a warehouse.

"At the end of the day, it's about having software systems that are designed to enable directed task management to satisfy key operational functions in an efficient and effective manner," Kareer says. "These capabilities can range from your run-of-the-mill business process automation to more sophisticated systems that use historical data to suggest tasks to provide a net improvement in throughput while minimizing labor."

Kareer says such capabilities can come from statistical models, optimization algorithms or machine learning techniques.

Catherine Lambert, Communication, Employer Branding & Government Affairs Strategist at Congebec, notes the type of AI they are using, and will be using, will not necessarily help with labor shortages but will impact worker efficiency.

"One example is in maintenance by providing more comprehensive data and analysis of temperature and energy efficiency. It will help us better identify areas that need to be made more energy efficient in our facilities," Lambert says. "However, the use of AI will require different qualifications in our employees with AI-related knowledge."

Inventory Management

AI can help warehouse operators improve inventory management through the use of advanced algorithms to predict future demand and optimize stocking levels, leading to more efficient inventory management and reducing the risk of stockouts and overstocking.

"As a 3PL, we are custodians of our customers' products and are responsible for the safekeeping and effective shipping of their orders – this gives us some deep insights into some of the patterns of receipts and orders and available inventory," Kareer says. "This information can help us provide our customer actionable insights and suggestions on how they may want to change their order shapes and inventory levels to reduce waste and improve operating costs during the receiving and shipping processes."

Sarda says with predictive analysis and analyzing demand patterns along with finding correlation to exogenous factors (e.g., weather, geopolitics, economy), inventory management will be far more efficient than when it is manually managed.

"Using AI to simulate multiple strategy scenarios and their impact on inventory on hand will also help executives make better business decisions," says Sarda. "At a tactical level, managing inventory inside of a warehouse should become easier as well with cycle count programs, dock cameras for identifying over, short and damaged (OS&D) etc. There should be significant reduction in inventory shrinkage because AI can help create better processes for auditing requirements and problem-solving."

Smarter Transportation

"At the end of the day, routing is a math problem so higher computing power will certainly help optimize routing capabilities," Sarda says. "But the impact will be bigger in transportation overall rather than route planning because AI can provide additional efficiency in predicting on-time arrivals, which will help warehouse operations better plan resources."

Lambert points out AI could be used to optimize transportation and take into consideration shorter trips to closer locations thereby reducing greenhouse gas emissions.

"There are lots of opportunities to reduce shipping and transportation costs for our customers by analyzing orders for a given customer or by offering options for shared load delivery across multiple customers," says Kareer. "Improved algorithms along with machine-learning techniques can be leveraged to suggest more sophisticated options on how to best satisfy their order fulfillment requirements in the most cost-effective manner."

Predictive Maintenance

Combining AI with IoT sensors will help analyze failure points on machinery in advance to prevent mechanical failures, says Sarda. He points out industrial manufacturers have been using AI for a while.

"Scheduling maintenance activities based on that intelligence will also allow you to manage labor shortages of maintenance experts," Sarda points out. "And AI can help with inventory management of spare parts, directly impacting the bottom line."

Lambert says AI helps to better manage a fleet of equipment used in their facilities in a much more effective and productive way. "Optimizing fleet management is key here as it helps to reduce maintenance on over-used equipment," she says. "It can also help to identify areas of concern to improve energy efficiency leading to a more effective preventative maintenance of our buildings."

ROI and Accessibility

AI is improving warehouse operations overall by automating tasks, optimizing inventory management, reducing labor costs, improving delivery times and reducing equipment maintenance costs.

With the help of advanced algorithms and automation technologies, AI can analyze data, make predictions, and provide recommendations that help companies make informed decisions.

"If deployed properly with large training datasets and the right application, there's a definite return on investment (ROI) in AI," says Sarda. "From data mining to robotic process automation, AI's payback in all things inside operations, as well as back-end activities, should be very attractive in years to come."

Sarda adds, when AI is built into greenfield projects, chances of success will be higher.

Lambert points out publicly accessible AI is also definitely accessible to smaller companies.

Sarda agrees. "AI or machine learning gets a scary reputation, but at the end of day, it's essentially training models that predict patterns based on good datasets," he says. "Applications can be varied, and with cloud computing becoming a more accessible service, companies don't have to invest huge amounts of money in infrastructure to get started."

Sarda adds that with external consultant network availability, companies do not have to even invest in internal resources.

Pressing Needs and Future Outcomes

Lambert believes today the most pressing need for AI in the warehouse is optimization of forklift movement in managing time and movement within the warehouse. And the next big thing – AI for production lines.

"This technology could allow us to better build our customer's bill of material to prepare them better for production. In this way, we could offer an enhanced supply based on production needs and great just-in-time food production," says Lambert. "It could even be managed remotely by knowing which ingredients are in inventory to provide the right material at the right time and better manage the production line as a result."

In the future, Lambert believes the biggest impact of AI on supply chains will be the need to integrate AI in the work flow and to optimize transportation. "For instance, AI could be used to manage orders and plan transportation more closely, which could mean transportation to closer locations to reduce GHG emissions."

Lambert adds that AI should be a top priority for human resource departments. She reports it is a tremendous tool that can be used specifically in HR departments to develop organizational structures in departments, job descriptions and the like. "But we have to remain vigilant and careful with the potential sharing of confidential information," she warns. "We've already developed and implemented internal structures, policies and procedures to manage the use of publicly available AI such as Chat GPT."

Lambert says surveillance by the company's HR department is required, which has been accomplished internally within the company's Code of Ethics and Business Conduct. "There is also a risk for a company's confidential information with service providers, which has to be taken into account," says Lambert. "However, an AI tool remains an advantage to build agility within a company."

To Sarda, the most pressing need for AI is in enhancement of computer vision guiding systems such as OS&D prevention or productivity of automated guidance vehicles. And the next big thing in AI in temperature-controlled warehouses – driving ESG initiatives like carbon neutral warehouses.

"The biggest impact of AI on supply chains in the future is it will allow executives to model multiple scenarios to test strategies against real world challenges," Sarda says. "It will help organizations in many ways – from increasing forecast accuracy to inventory management, controlling costs in operations by increasing efficiencies to automating back-end functions."

The supply chain is largely a set of independently managed links in the chain of custody from the farm to the table, Kareer suggests.

"Each link in the chain is trying to optimize its processes, independently leveraging the subset of data it has access to," Kareer says. "If you look at this from an optimization theory perspective, it becomes evident that there are limitations to finding the best solution when we look to solve the problem in silos."

Kareer notes AI is designed to reason over large data sets with myriad variables impacting effectiveness and efficiency outcomes. He believes if the industry was able to come together to share this data in order to understand the best way to get products moving most effectively through the cold chain, even greater benefits could be seen from AI.

By leveraging the power of AI, cold storage companies can stay ahead of the competition and provide better experiences for their customers.

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