THE RACE TO AUTOMATION AND VISIBILITY

Here's how companies are racing to implement automation and visibility.

Food Logistics
SDC SUPPLY & DEMAND CHAIN EXECUTIVE

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INTRODUCTION

An important step in achieving last-mile delivery and supply chain success is improving warehouse and distribution center efficiencies. Supply chain managers are adding technologies to their systems to keep up with an uptick in e-commerce demand and perennial workforce shortages. Meanwhile, the COVID-19 pandemic and subsequent lockdowns have only fueled consumer expectations for faster ordering and deliveries, quickening the pace of technology adoption.

"E-commerce has seen aggressive growth over the past several years, even before the COVID-19 pandemic," says Adhish Luitel, an industry analyst with ABI Research. "The pandemic triggered an extraordinary increase in demand for online orders. Suppliers are finding it increasingly challenging to keep up with rapidly growing market demand."

Supply chain companies are progressively investing in warehouse technology to keep up with these challenges. As ordering and warehouses become more complex, so too do the technologies needed to keep up. The traditional methods of inputting and tracking orders are no longer enough, so companies are turning to modern means to improve automation and visibility in operations. Some of these technologies include warehouse execution and control systems, labor forecasting, resource planning and scheduling, returns management systems, real-time capabilities, simulation and modeling, mobile apps and APIs, machine learning and artificial intelligence, cloud-based computing, telematics, mobile robots, wearables and more.

"Supply chain visibility is no longer a 'nice to have' for any organization, no matter the size, and now spans a multitude of vertical industries, use-case segments and geographies," says Bart De Muynck, VP and analyst at Gartner. "When it comes to domestic transportation, customers are demanding more real-time visibility into in-transit shipments."

The warehouse automation market is expected to grow to $27 billion by 2025; twice the size it was roughly five years ago, according to Research and Markets. The study attributes that growth to emerging multi-channel distribution channels, globalization of supply chain networks, increased adoption of micro-fulfilment centers, the emergence of autonomous mobile robots and rising need for same-day delivery.

The equipment market tied to warehouse automation will likely reach $8.7 billion by 2025, according to Interact Analysis. Those investments highlight the growing need for improved solutions to product distribution and delivery.

"As customer expectations for rapid delivery grow, warehouses are finding it challenging to process the amplified volumes of goods passing through facilities in time," Luitel says. "This issue is further heightened by labor shortages and staffing complexities due to the pandemic. This has brought about a market need for technology solutions in warehousing and logistics."

This 4-part white paper will uncover the logistics behind supply chain visibility, detailing how and what technologies companies are investing in, how companies are working to meet same-day delivery and what forms of technologies are best for mitigating supply chain risks. This series of white papers will break down grocery retail, last mile and warehouse automation, revealing how procurement software, enterprise resource planning (ERP), warehouse management systems (WMS), robotics and other automated solutions help companies better forecast for inventory, waste reduction, fleet management problems, a future in contactless and driverless, and more.

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EMERGING TRENDS IN WAREHOUSE AUTOMATION

Warehouse automation is the use of equipment and technology to improve the speed of order completion. It seeks to reduce the number of humans involved in rudimentary tasks. Software improvements are used to substitute or replace manual labor and to speed efficiency and better manage inventory.

The world of warehouse automation involves several software tools and hardware devices, from updated warehouse management systems to robots. Many companies have augmented their warehouse management system (WMS) and transportation management system (TMS) platforms to better capture data and add predictive analytics.

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Many companies have augmented their warehouse management system (WMS) and transportation management system (TMS) platforms to better capture data and add predictive analytics.

"Real-time transportation visibility platforms complement the planning and executional capabilities of TMS by providing real-time order and shipment visibility," De Muynck says. "These platforms are a core part of logistics technology and play a complementary function that supports transportation."

One burgeoning aspect of warehouse technology is the use of warehouse execution systems (WES) and warehouse control systems (WCS), says Dwight Klappich, VP and analyst with Gartner. WESs were designed to handle high-velocity warehouses, he says.

"WESs are a hybrid technology that blends capabilities from traditional WMSs and WCSs," Klappich says. "WESs enhance work management in automated warehouses and manage the interplay between automated and manual processes. WESs leverage near-real-time insight into work in the automated warehouse, combined with advanced business process logic to improve the flow and prioritization of work."

Klappich also points to labor forecasting analysis as playing a greater role in warehouse visibility in coming years.

"Most warehouse operations currently use rudimentary spreadsheet-based models to roughly predict labor requirements into the future," he says. "Some organizations have tried to convert product demand forecasts into labor forecasts, but this approach has failed because the data models are not the same."

While this technology is still new and under development, it will likely be improved to become more worthwhile, he says.

"General-purpose human capital management authorities outline various methods for estimating labor needs," he says. "These include managerial judgment, work/time study

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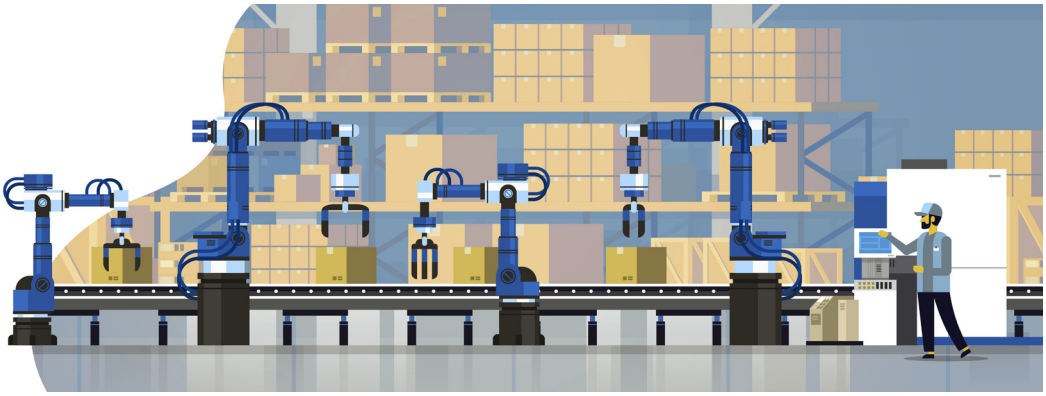

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techniques, also known as developing engineered standards, trend analysis, time series forecasting techniques, model-based simulation/analysis, and more recently, machine learning. Effective warehouse labor forecasting will likely combine several of these methods."

Luitel expects certain emerging warehouse automation technologies to continue to make an impact on the industry, such as automated storage and retrieval systems (AS/RS), radio frequency identification (RFID), augmented reality (AR), mixed reality (MR), cloud-based software and collaborative robots (cobots).

Cloud-based computing and storage, for example, create less of a need for large servers and IT specialists on-site and help reduce costs associated with warehouse operations. Using the cloud allows supply chain companies to better integrate new technologies and helps them collaborate with vendors and other partners. It also allows companies to receive and process information in real time.

"These technologies can lead to cost savings and productivity gains," Luitel says. "Warehouse operators are already seeing massive improvements in KPIs, such as inventory shrinkage (minimized damaged/lost orders) and total order cycle time (quicker end-to-end fulfillment process)."

Digital barcoding and RFID technology have long proven their worth in the warehouse. That value will continue to grow, especially as the use of the Internet of Things (IoT) and Industrial Internet of Things (IIoT) increases, he says.

"Devices and barcode scanners have been growing for years and are set to replace paper-based warehouse management documentation systems," Luitel says. "Integration of RFID with IoT enhances inventory management. Warehouse managers have increased their utilization of RFID for inventory counting and validation."

IoT allows warehouses to connect and monitor robots, drones, pallets, equipment, beacons and inventory. It also enables supervision of workers remotely in real-time.

"IoT enables devices and systems to collect, store and share data," Luitel says. "It also enables performance assessments and warehouse tracking of all connected devices, such as temperature in cold storage facilities and vibration in motor tracking."

Cobots are also making an impact in productivity, as they prove they can reduce wasted hours on the warehouse floor.

"Cobots are expected to gain popularity in warehousing because they significantly reduce the time it would take to complete tasks," he says. "Just last year, there were over 20,000 shipments of collaborative robots to warehouses and distribution globally."

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Adhish Luitel,
Industry Analyst | ABI Research

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AUTOMATION INVESTMENTS

When it comes to technology and automation, supply chain companies are investing most in picking and packing operations, locating items and unloading items, Luitel says. "Gripping and picking robots backed by a machine learning-powered platform can harness improved pick-and-pack results with every iteration," he says. "They are much quicker and more precise than manual pick/pack."

Anyone working in e-commerce supply chain management or retail buy-online/pickup-in-store (BOPIS) knows how time consuming and cumbersome it can be to locate items for pick and pack to fulfill orders.

"Technologies like autonomous mobile robots, voice picking solutions and AR-based solutions like smart glasses coupled with IoT solutions such as Bluetooth-enabled trackers can aid in quick location of such items," he says.

When it comes to unloading trucks and pallets, several new technologies are coming into play, to not only improve speed, but to also increase safety for workers, such as automated-guided vehicles (AGVs) that move pallets.

"Autonomous forklifts and exoskeletons are also popular investments to enhance this process," Luitel says.

Other major investments are in AS/RS and AR/MR. AS/RS involves computer and robot-aided racking systems that retrieve and pick up orders from specific locations. The global AS/RS market was valued at $7.3 billion in 2020 and is expected to have a compounded annual growth rate of 10% from 2020 to 2030, according to Luitel. AR/MR technology includes software like voice technology and hardware such as smart glasses. The global AR market is expected to generate revenues of more than $15 billion by 2025 in warehousing and logistics, he says.

"In 2020, many retailers rushed to automate and invested in robotic fulfillment and micro-fulfillment centers," he says. "The demand for autonomous mobile robots (AMRs) and AGVs were an all-time high in 2020. Automated logistical processes have always been the long-term end goal for companies. However, companies are investing more diligently and at a higher rate than they did previously, due to the pandemic."

Retail and grocery stores also rushed to automate micro-fulfillment and distribution centers, says Rob Wilson, managing director and partner at L.E.K. Consulting.

"The benefit is, it enables you to do some home delivery directly from your distribution center, similar to what Amazon has done," he says. "I think we'll see some of the scale players do that a little bit more."

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IMPROVING SAFETY

Whenever manual tasks are at play, safety is at risk. Warehouse work is taxing and can take a toll on muscles and joints, sometimes creating repetitive motion injuries. The U.S. Bureau of Labor Statistics reports that 5.1 out of every 100 warehouse and storage workers are injured or experience illnesses annually.

Warehouse technologies also have a place when improving safety efforts, Luitel says. "Warehouse safety is another critical component of warehousing operations that some of the most popular technological solutions seek to address," he says. "The use of exoskeletons for warehousing operations is another trend that has been increasing due to workforce safety and productivity enhancement."

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FUTURE OF WAREHOUSE AUTOMATION

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The supply chain companies with a competitive advantage in the future will be the ones that combine technology solutions to best improve productivity, Luitel says.

"The combined advantages of location technologies, hands-free operating systems, workforce analytics and optimization software have great potential to alleviate the operational and financial pressures of modern warehousing," he says.

Technologies in their early stages, such as predictive analysis, digital twins and synthetic aperture radar, which creates finer resolution than traditional radar, will likely take part in future warehouses, he says. So will technologies that can be embedded into the entire framework of an operation.

"There are more 'wall-to-wall' technologies that can enable an entire ecosystem of automated fulfillment processes," Luitel says. "Forward-looking considerations, such as future-proofing operations and holistic supply chains are some of the components that must be considered, as well."

Throughout the lifecycle of supply chain management, innovative technology is taking on greater importance. One of the main objectives of this technology is to provide improved productivity and better visibility into the supply chain. There are many exciting technological developments on the horizon that will continue to benefit supply chain management.

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